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Editors of Electronic Games

'Last year **Miner 2049er** won a landslide victory as Electronic Game of the Year. Now this delightful multi-screen climbing and jumping game has ascended the next rung on the ladder of fame in the same high style by coasting to a triumph in the Hall of Fame voting. **Miner 2049er** has historical significance as well as intrinsic value. It was the first electronic game designed for the home market which could be played on almost every videogame and computer system. The multi-publisher licensing made Miner the first home game to acquire a hobby-wide reputation on a par with leading games found in the family amusement centres. Bounty Bob Lives.'

Electronic Games Hall of Fame

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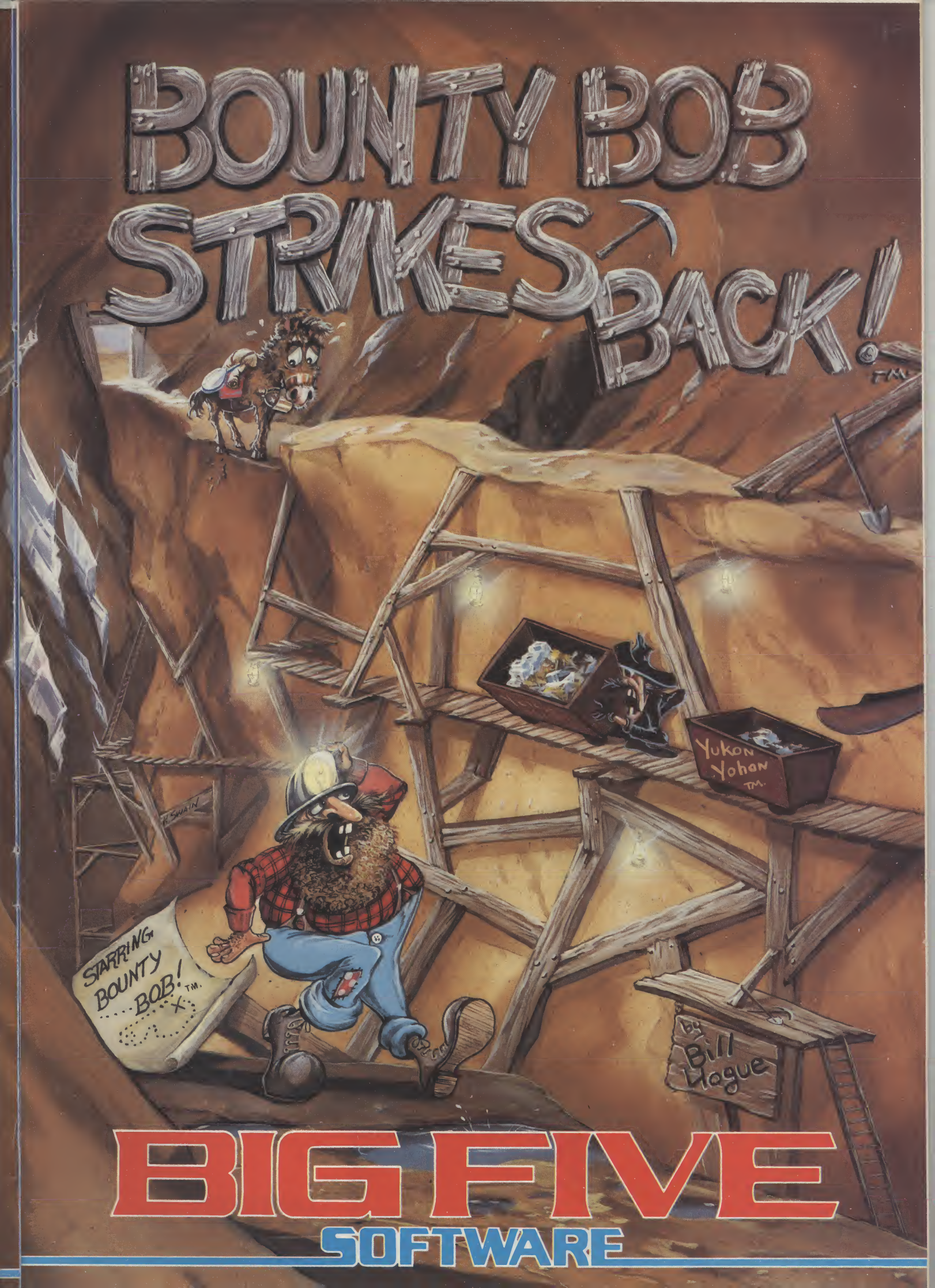
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STRIKES BACK!
STARRING BOUNTY BOB!
YUKON YOHON
BY Bill Hogue
BIG FIVE
SOFTWARE

The one magazine every Commodore owner needs

COMMODORE COMPUTING INTERNATIONAL

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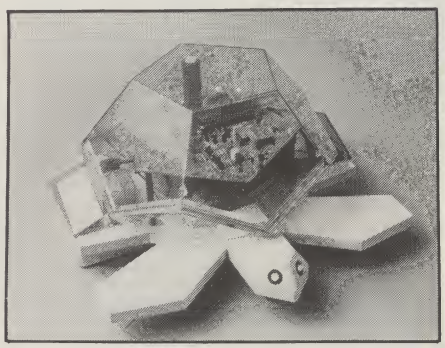

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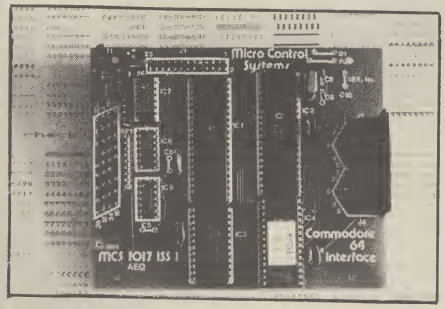

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Comment...

Dear Reader,

In a recent survey of CCI readership we found that, after programming, the most frequent and time intensive use of the computer was for games. Does that suggest that the extraordinary speed, power and scope of the Commodore computer is being thrown away as just a games machine? No, I think it means that even if 'serious' applications such as database management and word-processing — two other very popular uses — are strong interests that the computer game has also a very wide appeal to a large and varied audience.

The arcade game, covered in depth in this issue, offers possibilities for fun and for a challenge. The competitive spirit is clearly aroused — sometimes to extremes; watch our for flying joysticks! — by the 'shoot 'em up, zap 'em down' arcade game which has universal appeal. And I would claim that the hunting, fighting instinct in us all is much less anti-socially satisfied in computer games than many other 'sporting' pursuits.

Games manufacturers are fully aware that there is a constant demand for novelty and have, over the years, kept up a flow of increasingly complex arcade games. 1985 will almost certainly see a slowing of the flood of individual releases. The games will be fewer but 'bigger' — more clearly linked to publicity hooks like films or TV shows. The games market will become more like the music business, concentrated in the hands of fewer but more powerful manufacturers and distributors.

This trend will be noticeable at the 6th Commodore Show, the earliest news of which you can read in this issue. It looks like being the most exciting show yet including the first UK view of the exciting new C128 — which is, we are delighted to tell you, 64 software compatible. If you are one of the many, many CCI readers who are keen on the latest in games and other Commodore information, follow the Commodore Show bulletins — and the special offers — in forthcoming issues of CCI. In the breaks between saving the universe from alien invaders or scoring a zillion championship points or even zonking Kong.

Antony H. Jacobson
PUBLISHER

Editor ..... Susan Pearce
Staff writer ..... Viola Gienger

Production Assistant . Polly Strauss
Illustration ..... Max Millian
Alison Watson

Advertisement Manager ..... Peter Chandler
Assistant Advertisement Manager ..... Paul Fenton
Subscriptions Executive ..... Alison Stevens

Publisher ..... Antony Jacobson

Cover Design .... Graham Baldock
Cover photography ... Digital Arts

Contributors:
Bill Donald
Peter Arnott-Job
John Mann
Bob Davis
Tony Lydeard
Mike Hart
David Bowdrey
David Hornsby
Anthony Maxel

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...news...news

First details of Commodore Show

The host will have something for everyone at the Sixth International Commodore Show in London this June.

Ranging from sophisticated hardware such as a yet-unannounced Unix-based computer to the exciting launch of a sequel to International Football, Commodore UK expects to put on an impressive bash. Calenders should be marked for 7–9 June at the Novotel Hotel, Hammersmith.

"We've got an awful lot on our plate in 1985," said Stuart Muirhead of Commodore's Marketing Services department.

Hoping to snatch its own bite of several different markets — IBM, Apple, Unix-based — Commodore's plans for this year alone include the PC, Amiga and the 900, all of which will have some presence at the Commodore Show.

The rush started with the PC which was previewed at January's Which Computer Show and officially launched in late March. Muirhead says the public finally will get a first-hand look at the PC during the June show. "It's going to be the machine that starts us back into the business market."

The Amiga, with its Macintosh-like MC68000 chip, was launched in the US earlier this year and is expected to make it to Britain by the end of the summer. Muirhead says CBM may bring three or four of the computers over from the US "to show what it's actually done." It is unlikely that these samples will be available to the general public at first with the preview aimed primarily at retailers and those within the industry.

Commodore bought the Amiga in its original form last year. At the time the specifications were a 128K CPU, expandable to 256K with a 5.25 inch disk drive, built-in modem and option for hard disk. Muirhead said, "It's probably got the best graphics available in the world."

Still higher in the market is the planned C900, a computer that will take CBM into the world of multi-user, multi-tasking micros. Muirhead said it's possible the June show could include a publicly-known version of the Unix-based C900, which is planned for official launch later this year.

Then there is the C128, also launched to the US in Las Vegas. Muirhead quenched industry rumours of two versions of the 128 saying, "I think what they're doing is getting it confused." The computer can be used in its 64-upgrade mode for running any 64 software though with a larger RAM of 128K or in CP/M mode. "At least this year there's just one," Muirhead said.

International Basketball will be the highlight of Commodore's software offering for existing computers. it's the sequel to International Football, which recently made it into the Top Twenty a second time around. Whether there will be other programs along the same line is unclear, though.

CBM won't be doing much software for its PC since the computer's compatibility with IBM leaves it open to the thousands of packages already available and the many still to come. But there likely will be a section of the Show devoted entirely to business users.

Fun, games and education will still take the largest emphasis. A special events room will give games buffs a chance to win prizes of hardware and software by competing for the highest scores. The competition will be held in different sessions to give more people a chance to win.

Certainly Commodore won't be the only one at the Show. At press time, 13 companies had confirmed they would exhibit and the final count is expected to exceed 100. CCI will be there, of course, and we'll be publishing updated information in following issues and in the official Commodore International Show Guide.

Other exhibitors already confirmed are:

Zero Electronics
Supersoft
Llamasoft
Bubble Bus
Mikro-Gen
Alligata
Hago
Viza Software
Tirith
Duckworth Publishers
Computer Bookshop

Dollar is key to PC price

With the official launch for the Commodore PC set on 22 March, Commodore UK waited until midnight 20 March to set a final price for the machine.

At press time, a spokesman for the company said, "Commodore are obviously studying the trend of the dollar very closely. They want to get the best price possible considering what the dollar is doing. A lot of American companies have had to raise their prices and Commodore don't want to have to do that."

Since the announcement of the PC, five major distributors have been signed to handle it, breaking with CBM's tradition of distributing the machines itself. They are Northamber, STC Electronics Serviecs, Norbain Micros, Westwood Computers and Pete And Pam.

The PC will be manufactured in West Germany along with CBM's other business computers. The international company hopes this IBM-compatible will lead its own re-entry into the business market.

Software bill is unopposed

A bill extending copyright law to software is sailing easily through Parliament and probably will be law by late autumn.

A spokesman for the main proponents, the Federation Against Software Theft (FAST), says the Copyright (Computer Software) Amendment Bill received no opposition in the House of Commons where it was accepted by both parties through the first and second readings. It is now in Committee for consideration of any amendments to the bill, then goes back to Commons, through the House of Lords and then to be considered for Royal Assent, usually a formality.

"People from all sides seemed to be supporting it, all of whom welcomed the measure," FAST said, "We're really very confident that it will go through without a problem."

Software houses who are members of FAST estimate they are losing about £150 million a year to illegal copying. The bill is aimed primarily at mass pirating and includes two categories of crime. The first is for selling, exhibiting or possessing illegally copied software with a maximum fine of £2,000 or imprisonment of up to two months. The second category covers making, distribution or importation and carries a penalty of unlimited fines or two years imprisonment or both.

The video industry backed a similar bill to extend copyright law to video tapes about two years ago. Before the law went into effect, the industry estimated about 60 percent of the tapes being sold were pirated. Now the figure is more like 30.

"It's fair to say the extent of the problem is not up to that level yet," says FAST of computer software, "But what there is we would look for that to stop with this bill."

According to the normal timetable, the bill would finish its journey through Parliament by August. FAST believes it may be sooner since there is no opposition.

The law would go into effect two months after Royal Assent.

Soft-Aid price up

The organisers of Soft-Aid, the computer industry's answer to Band-Aid, have put the final selling price of the games compilation tape to £4.99 to raise more money for the project than the original £2.99 price would have.

A spokesperson for Quicksilva, the company spearheading the project, says more than £3 of each cassette sold will go to the fund. The remainder pays for production costs, printing and VAT. She says participating software houses felt the original price was too low considering the quality and range of games on it. W.H. Smith and Boots retailers have agreed to stock Soft-Aid free of charge.

The cassette combines 10 games from leading software companies to raise money for the Ethiopian famine appeal. It includes the best-selling single "Feed the World," which already has raised millions of pounds for Ethiopia.

The C64 version features the following games: Gumshoe from A&F Software; Beam Rider, Activision; Startrader, Bug-Byte; Kokotoni Wilf, Elite; China Miner, Interceptor; Gilligan's Gold, Ocean; Fred, Quicksilva; Gyropod, Taskset; Flak, US Gold; Falcon Patrol, Virgin.

School teams win computers

Schools in Falkirk, Suffolk and Nottingham each received £1,000 worth of computer equipment as first prize winners in the John Menzies Young Programmers of 1984 competition.

Entering schools, in three age groups, were asked to write a computer program to find the missing numbers in a sequence. The computer also was required to report what it was doing while searching for the answer so that an observer could follow its thought processes.

The competition was judged by a panel led by well-known professor and researcher Donald Michie of Edinburgh University's Artificial Intelligence department.

"I was delighted to help in the judging of the entries and I'm sure the whole learning process in schools can be helped by more of the same," Michie says. "It is good to see artificial intelligence now filtering into the classroom."

The winner in the under 12 category was Deben High School of Felixstowe, Suffolk, with Cathryn Drew as the sole contributor. In the 12 to 15 year old category the winner was Graeme High School of Falkirk. Members of the team there were Martin Downey, Grant Ormsby, Stuart Craw and Neil McLennan. John Dove won the award in the over 15 category for Chilwell Comprehensive School in Beeston, Nottingham.

Devon firm to handle Prism modems

A Devon-based communications consultancy will be handling all communications items previously supplied by the financially-troubled Prism Microproducts Ltd.

Modem House said it will now supply items such as the complete modem packages that Prism offered for the Commodore Pet range, C64 and other machines.

A statement released by Modem House said, "The acquisition of the Prism range of products represents a significant shift in the marketing policy of Modem House, who have traditionally concentrated their attentions to the business user and business sector.

"It will be interesting to see what effect the drastic change on marketing policy the entry into the retail sector will bring to this relatively little known organisation."

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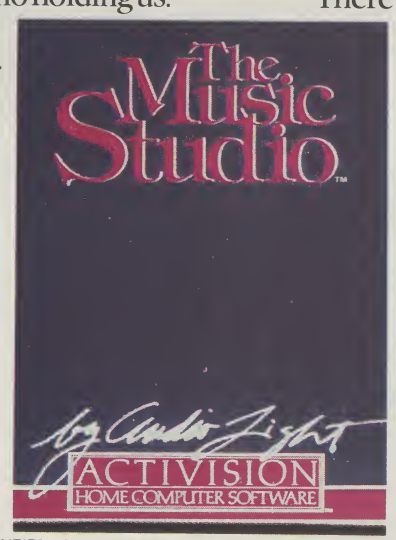

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Sue Pearce introduces the Commodores to the world of Commodore and asks for the band's comments on Siel's CMK 49 keyboard which interfaces directly with the 64

The Commodo

The Commodores are no strangers to computer-generated music. In fact their very first hit, Machine Gun, was made using synthesisers.

From its conception in 1969, the band has continued to incorporate synthesised music in its songs. "Both synthesisers and traditional instruments have their uses," says William King who performs on arp synthesiser, trumpet and percussion. "We don't use synthesised sound in every song. Sound is very important, certain sounds create certain effects.

"It depends very much on the song — Three Times A Lady just wouldn't be the same with synthesised sound!"

A basic computer system was also used on the Commodore's latest album, Nightshift. "Not a Commodore, though!" admits William.

Commodore Computing International met the Commodores in London during their recent European tour. We asked them their opinion of Siel's CMK-49, a 49-note keyboard which we gave our first impressions on in the March issue.

To recap on the CMK 49: it's a complete package costing just £125 and comprising a 49-note keyboard, a specific MIDI interface and software which is available both on cassette and disk. The keyboard interfaces directly into the cartridge port of the 64 (and SX-64) and uses the SID chip for all music synthesis. Ninety-nine monophonic or polyphonic sounds can be created and stored on disk or cassette.

Sound is relayed through your television speakers but you can achieve far superior sound if you link up with a hi-fi system or external amplifier. This can be done using, respectively, a cable with DIN and RCA connectors or a cable with DIN and JACK connectors.

"Two people existing in one"

Milan Williams, keyboard player for the Commodores and known for his innovative synthesiser work, says: "A computer has to be user-friendly and it's the same with synthesisers. I have a computer — I also play synthesisers. It has to be two people that exist in one person to use something like this.

"You have to know what ADSR means, what filter mode to use, wave shapes..."

Thirty-nine presets are included on the accompanying software and new polyphonic and monophonic timbres can be created within the programming unit section. The user can change ADSR (attack, decay, sustain, release) by entering the required level indicated numerically.

William says: "Most keyboards with this kind of thing have a knob to push up and down (although the Yamaha DX-7 has numbers). When you are pushing you can be uncertain whether you are at $2\frac{1}{3}$ or $3\frac{1}{4}$. Others have lines. Once you get to a level you want it to be exact." This is where William thinks the use of numbers as opposed to twiddling knobs gives more exact results.

On the same subject, however, Milan has a small gripe. "Quality control is really important. There should be an on-screen

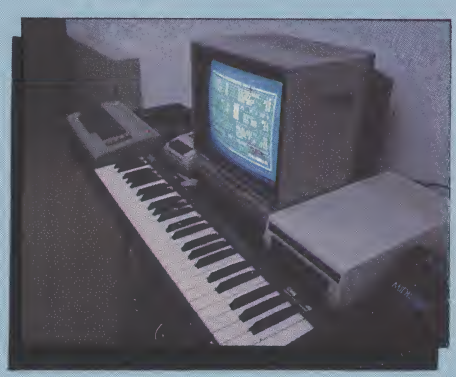
From left to right, J.D. Nicholas, William King and Milan Williams of The Commodores.

dores hit the right notes for CCI....

index for each section. For example does Attack start from 0-100?"

It is actually 0-10, as you discover by moving through options, but Milan's point is one of saving time finding out for yourself.

As we mentioned in our 'first impression', while most presets give the expected sound, others require a little imagination. Milan confirms: "The program disk doesn't necessarily give you the sounds that are there. The person who programmed the disk did the correct sounds for most and you can program sounds in yourself. If you have to change the program, that's more than people are bargaining for. If you have the technical knowledge you can beat it."



"Thumbs up for the MIDI option"

A big plus for Siel's CMK-49, in the eyes of the Commodores, is the MIDI option. Through Siel's MIDI interface (£79) any MIDI equipped instruments, such as the Siel, Roland and Yamaha keyboards which the band use on stage.

With this option you can effectively interface an unlimited number of instruments, using the Siel CMK-49 as the master keyboard or otherwise.

"I can only relate to instruments I have used before," says Milan. "But here we have a computer synthesiser interfaced with the 64 and with MIDI. If it is as functional as it seems, a lot can be done with it."

In conclusion, Milan says: "Siel have a great idea here." William continues: "The market for this item is the person who already plays keyboards and wants to write and create, but not on the level of an experienced musician ... he's going to have a ball with it!

Both William and Milan felt that a little more on-screen help could be provided. "The first steps should be like ABC," says William. "I think lessons should be part of the package. We have a certain knowledge of this kind of thing, but take someone off the street and see if they can do it."

(In our 'first impressions' we concluded that although the program is indeed quite technical in places, even the musically ignorant should be able to produce interesting results through trial and error.)

"An ideal musical tool for kids"

William also feels that the CMK-49 would be an ideal tool to teach children more about music. He says: "A child would rather play this than play on a regular keyboard. Kids like to fiddle. Not only can they fiddle with this, but they can watch their ideas on the screen.

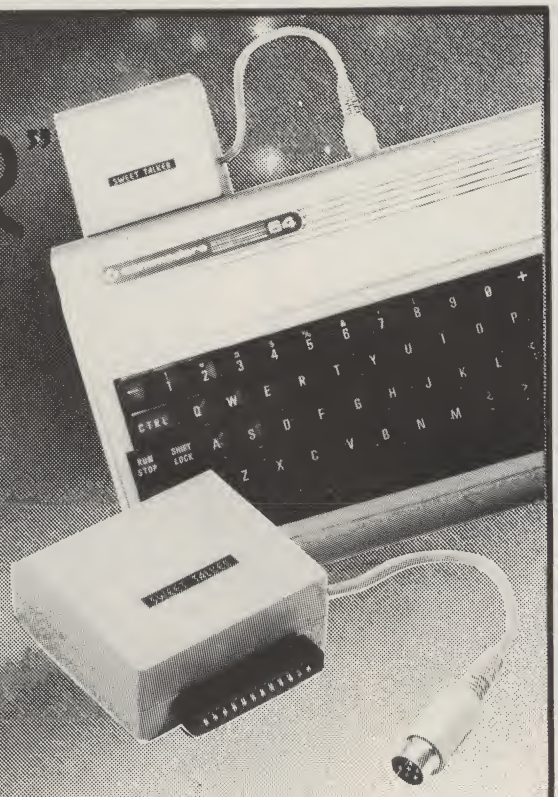
"In America, schools have computers in classes. My seven-year-old is using them. Keyboard and computers are more fun. This is the century of computers and computerised sound," William continues.

"This isn't supposed to replace the original instruments." However for those not over-concerned about the quality of sounds, buying Siel's CMK-49 does eliminate the need to buy several instruments.

William says: "People can use everything in one unit. Everything is built in. You can do everything yourself — you can play bass, lead and guitar!"

Contact: Siel (UK) Ltd, AHED Depot, Reigate Road, Hookwood, Horley, Surrey RH6 0AY. Tel: 02934 76153/4.

COMMODORE SWEET TALKER"



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What do you mean, INTELLIGENT?

Anthony Maxel looks to the Fifth Generation of computers and mulls over the question of whether machines can really think

In a very ordinary office building in Tokyo, a group of highly dedicated young researchers is at this moment engaged in designing a new generation of computers that will transform the way the Japanese work and live. Almost certainly, in contrast to the past in which Japan has grown prosperous copying the West, the West shall be forced to follow where the Japanese have led.

The machines that will bring about this carefully planned revolution are called KIPS — Knowledge Information Processing Systems. KIPS is a new generation of computer hugely more powerful than any the world has yet seen. But KIPS' real power will not be, as today's computers, merely in processing speed, but in their apparent capacity to reason. That ability to reason will be based on enormous amounts of information constantly selected, interpreted, updated and adapted as the computer *itself* deems necessary.

The Japanese expect these computers, which will allow users to speak with them in everyday conversational language, or show pictures to or transmit messages by keyboard or in handwriting, to penetrate every level of society.

The Fifth Generation of computers will not even require the user to be specific about his or her needs, for they will have the reasoning power to elicit by question or suggestion exactly what the user wants to do or know. And, finally, these new machines will be inexpensive and reliable enough to be used everywhere — in offices, factories, restaurants, shops, farms, fisheries and, of course, homes.

"Not a sci-fi prediction"

This is not some wild-eyed SF prediction but an already established state-supported project; extremely well financed, staffed with highly-qualified and motivated people and with a target year for success of 1991.

Many in the computer world do not take it seriously. Indeed the Japanese plan is so daring and dramatically progressive that it may well not be completed in the ten years

set out for it. Nevertheless, the Japanese drive for the world market in KPS should not be underestimated. Who in the 1960's took seriously the Japanese initiative in motor cycles and small cars? Today they outsell every other nation and have to be made to restrict their exports 'voluntarily'. In 1970, who took seriously the Nipponese national goal of becoming number one in consumer electronics? Not only does virtually every video recorder produced today originate from Japan but have you noticed the Sony Walkman, the Aiwa amplifiers, the Panasonic TV's and the rest? In 1972, when the Japanese had yet to produce their first commercial micro electronic chip, they announced their plan in this technology. In ten years they gained half the global market for the world's most advanced memory chips.

"Knowledge: a saleable commodity"

Their goal is not only to dominate the traditional forms of the Computer Industry but to establish a 'Knowledge Industry' in which knowledge will be another saleable commodity like rice or motor cycles or transistor radios. For, they believe, not land nor labour nor energy but knowledge itself is to become the new key to the wealth of nations.

While officially almost contemptuous of the Japanese initiative, IBM is, in fact, investing substantially in research into KIPS. In the UK and France there are also some small scale research projects being carried out, particularly at the academic level. However, it is the vision of the Fifth Generation of the Japanese that presently leads the world into what will be effectively, the Artificial Intelligence Revolution.

The strategy is set out in a major and impressive plan of the Japanese Ministry of International Trade and Industry (MITM). It calls for a staged ten year research programme. The implementation began in 1982 with the founding of the Institute for New Generation Computer Technology (ICOT) and in co-ordinated laboratories of all major Japanese firms in the computer industry. But what exactly is KIPS and what will these Fifth Generation computers do that is so extraordinary? Why will they make the world so different and how will they affect our lives?

The simple answer is that the world has changed since the Industrial Revolution. The lessening reliance on human physical strength has meant increasing scope for the use of the human mind. This has brought about the rise of the expert — the person who can by his or her knowledge dominate and control machines and people and organisations.

Why should the Japanese now be so interested in the Fifth Generation computers. The answer is simple. The computer market today is dominated by North American corporations — IBM, DEC and in home computers, Commodore. The Japanese do not want to risk a head on confrontation so they want to leapfrog into the 1990's and into the KIPS generation. Japanese planners view the computer industry as vital to their nation's economic future and have audaciously made it a national aim to become number one in the industry by the latter half of the 1990's.

"Knowledge is power"

Today, knowledge — expert knowledge — is the central point on which our world pivots. Give me an expert, says the industrialist, the businessman, the politician, and I can move the world. The time when the educated man could know almost everyth-

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ing of importance has long gone. The world has split into a million expertises and expert knowledge has become arcane, jargonised and highly valuable. And this trend will become ever more significant in the future.

As is frequently said, knowledge is power. Machines that can amplify human knowledge will amplify every dimension of that power. KIPS — highly powered 'expert systems' apparently will possess what present day computers do not — intelligence. They will make the extremely important shift from mere mechanical data processing, the way today's computers work, to an *intelligent* processing of knowledge.

Forms of such processing are already in use. Modest pilot projects, with the name of expert systems (see CCI April issue 1985) have demonstrated that a computer is capable of the same kinds of intelligent behaviour as, for example, a physician making a diagnosis, or a geologist deciding where to seek minerals. And these expert systems do this in much the same way human experts — by combining textbook knowledge with the rules of thumb taught experience and then making informed guesses on the situation at hand, whether about sick human beings or over range and basin. We call such expertise in humans 'intelligence', 'intuition', 'inspiration' and 'professionalism'. When a machine demonstrates the same kind of behaviour, is there not a justification to call it intelligence too.

Our present computers can be programmed to do those tasks, and do them at a high level of expertise, often outperforming human experts (even the ones who have taught them). Moreover, computers can be made to exhibit expertise over a very wide range of fields. New expert systems are being commissioned and designed all the time. Nevertheless, for the purposes of expert systems, our present computers are at a fairly primitive stage of design in terms of speed and power. The knowledge manipulation on a grand scale of humanlike intelligence planned for the Fifth Generation will require moving up by several orders of magnitude both in hardware and software.

"Can machines really think"

There are many who do not believe that there is such a thing as AI — Artificial Intelligence, that machines cannot under any circumstances, no matter how fast or powerful, really use intelligence or think. Thinking — the organised use of intelligence — it is claimed, is by definition a purely human faculty. It requires, in addition to logic, creativity and originality, and no machine can be creative or original. Intelligence, it is said, requires unique experience ... a form of interaction with the real world and other people of a similar structure of thought. Nobody, it is said, has yet succeeded in making a machine that is capable of 'intelligent' behaviour ... and, even if a machine can perform a variety of tasks, it still would not be conscious of having done them and consciousness is a fundamental part of intelligence. And so the arguments go on.

A favourite anti-AI example is that of the chimpanzees and the Chinese pictographs. Take some chimpanzees and enclose them in a room with one hatch on each side. Pass Chinese words, which are really a kind of complicated picture, in from one side and require the chimps to pass out photographs of objects which correspond to the Chinese pictographs through the other. After a while, if you reward the chimps for success, they will infallibly hand out an appropriate photo for each Chinese word you have passed in.

"Mindless learning or intelligence?"

But, the anti-AI campaigners ask, have the chimpanzees learned to understand Chinese or have they just mindlessly — unintelligently — learned a profitable skill? Learning is one thing, intelligence another... It is suggested that a computer, in the same way, may learn to perform the most complex of tasks with amazing speed without the slightest understanding of what it is doing. Ergo, for computer — and for us — Artificial Intelligence does not exist. But, of course, that begs the question 'What do you mean by Intelligence'?

One dictionary definition of intelligence is 'the *exercise* of the understanding' — not understanding itself; another is 'acquired knowledge' — not too far from the presumed ability of the Fifth Generation machines. As doubtless you are aware, 'intelligence' derives from the Latin, 'legere' — to gather or to choose, both actions, it would seem likely, that a KIPS machine could perform with considerable success.

Like many, I cannot make up my own mind as to which side of the argument to support. The problem is not, however, merely academic. For it may to some extent govern the way we regard, respond to and deal with legally, practically and personally — the growing use of expert systems and AI in general.

We are moving into a technology that, through the Japanese project, IBM and the developments around the world, will play an influential role in our lives. The power that knowledge-based systems gives us will pose immense problems, and make for enormous changes. And there are no expert systems, or even experts, that can tell us what effect new technology will have. Apparently small or irrelevant technological changes can have amazing results.

After Gutenberg's development of movable type the total number of books in Europe leapt in 50 years from 100,000 to 10 million. This brought the rapid spread, first, of literacy, then of knowledge and profound effects of both. That one simple technological development led to immense social changes even new political systems like the replacement of the divine right of kings by the rule of vote and the devestation of rigid social orders by the demand for change and freedom. It led, accidentally perhaps, to the opportunity for the individuals to learn of alternatives to existing accepted ideas and structures and offered the power to think and to decide for themselves.

"Implications of inhuman knowledge"

We do not know what changes Artificial Intelligence, KIPS or Expert Systems will bring. We do not know whether, even given the same knowledge that humans use, a machine or a system that could think farther, faster and maybe deeper would necessarily move its thought in the same directions as a human being. And, if it should take a different path, what would lie at the end of that path. We do not know if new knowledge can be discovered by a machine or what the implications of such 'inhuman' knowledge might be. We do not know if a knowledge network, national or international, will be used beneficially or misused dangerously by governments, corporations or others whose own interest may clash with ours. We *do* know that with the growth of AI life will not necessarily become simpler; that we shall need systems, legal and others to protect our privacy, our rights and our desired quality of life. Yet the irony is that probably only expert systems, highly developed in AI can really protect us against those other, possible inimical systems which will be seen as commercially or administratively convenient for the world of the 90's and the next century.

One prediction I will make: it will certainly require a considerable sharpening of our own critical and analytical — human — intelligence if we wish to ensure that the Artificial form we create remains ever our subordinate and never becomes our master.

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Musical mastery

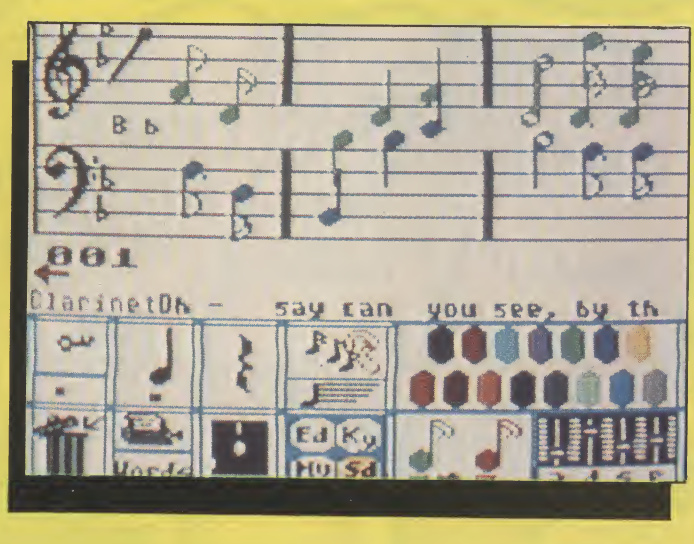
Sue Pearce and Viola Gienger cast their eyes — and ears — over music packages for both the beginner and the talented. We start with Music Studio from Activision.

Designed in the tradition of the popular Designer's Pencil, the Music Studio from Activision is a proud successor.

With a baton-like instrument to replace the Pencil's paintbrush, you use nothing more complicated than a joystick to learn the ropes of complex musical terminology and the sounds that go with it. The joystick control is what sets Music Studio apart from all other music packages and makes it usable by the beginner and convenient for the practiced musician.

Written in the US, the Music Studio retails for £19.99 on disk, £14.99 on tape, but gives you so much. If the unfinished version CCI looked at is any indication, and we're sure it is, this package will be one of the year's great successes.

Let's start at the beginning. The first screen used shows two large musical bars across the top half of the screen. The bottom half, just for a start, contains boxes of drawings illustrating available options of notes, length of notes, instruments, rests, sharp/flat and lyrics (the only situation requiring the keyboard).



"Listen as you are writing"

A four-squared section gives you the choice of modes or facilities — Studio, Music, Key and Edit. For example, you would begin in Studio mode to choose a note, its length, where you want it to appear on the bar and the instrument you want it to sound like. Then go to Edit mode to add or delete notes, delete or copy bars in different clefs (base or treble) and move one or several bars. In Music mode, you could choose to listen as you're writing, speed or slow the tempo, control volume, repeat a passage or scroll to the beginning or end of your composition. In Key mode one of the functions is to change or transpose the key of one or more notes.

If you know nothing about music you're sent to the Music Paintbox section where instead of digging straight into incomprehensible musical notation, you work with little blocks that you adjust in size and colour to indicate what instrument you want it to be and what you want it to sound like in tempo, pitch, etc. If you set one and then change your mind, simply bin it. There's a clearly-drawn metal bin in the bottom left corner of the screen for just that purpose. How much more clear could it be?!

Later when you feel you're ready for the real thing or you want a musician to look at your creation, Music Studio will translate what you've written with blocks into proper musical notation. For the user with some musical experience, the Music Editor takes the place of Music Paintbox by allowing tunes to be written in musical notation.

"Printed copy in proper sheet form music"

Any composition can be saved to disk or printed out with Music Studio. Though we didn't see this function ourselves, Activision says the printout involves no cutting, chopping or rearranging as many music packages do. Rather, the printed copy is in proper sheet music form.

And if you don't feel like working and just want to relax, you can load any one of about 30 pre-programmed tunes from the Music Studio disk and, if you like, you can make it scroll along the musical notes being played. The songs range from an excellent Bolero (if you're not sick of it!) or a waltz to electric rock.

But suppose hearing music inspires you to creativity and you think you can do better than what's already there. Other functions let you change the key, octave, instruments and various other parameters in the pre-set jingle to suit your tastes.

And that's just one screen!

Music Studio shows yet another dimension on the ADSR screen. Designed for the more experienced user, this facility lets you adjust ADSR (attack, decay, sustain and release) as well as waveforms, frequency, resonance, filters and numerous other parameters.

"An exciting comprehensive package"

This screen also provides instrument-changing functions with a choice of 14: keyboard, ragpiano, flute, oboe, sax, bass sax, violin, synthesiser, trumpet, harp, tuba, piano and clarinet.

Music Studio is an exciting, comprehensive package, particularly for the price. It is a valuable tool for teaching the simplest musical concepts while providing the complex facilities required for true music composition. Each screen is presented in a colourful, interesting and original format that gives the greatest flexibility possible. It can be used alongside the Koala Pad Touch Tablet for freehand composition and allows the user to hook up to a hi-fi for better sound.

For computer-generated music, I could find no subject that this brilliant package left untouched.

Contact: Activision UK Ltd, 15 Harley House, Marylebone Road, London NW1. Tel: 01-486 7588.

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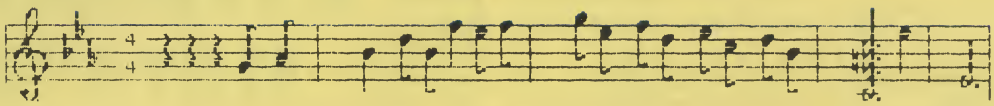


If you already have a MIDI-equipped synthesiser and you're wondering how to link it up with your 64 for the best results, take a look at the Joreth Music Composer System (MCS).

At £200, the MCS combines an interface, the AL25 MIDI link, and disk software. It is designed to supply musicians of all abilities with a composing/recording tool which is both simple to operate, but powerful enough to cope with a vast range of musical tasks. Essential equipment to have is a 64, 1541 disk drive or equivalent equipped for serial port use, a MIDI equipped synthesiser, and a TV or monitor.

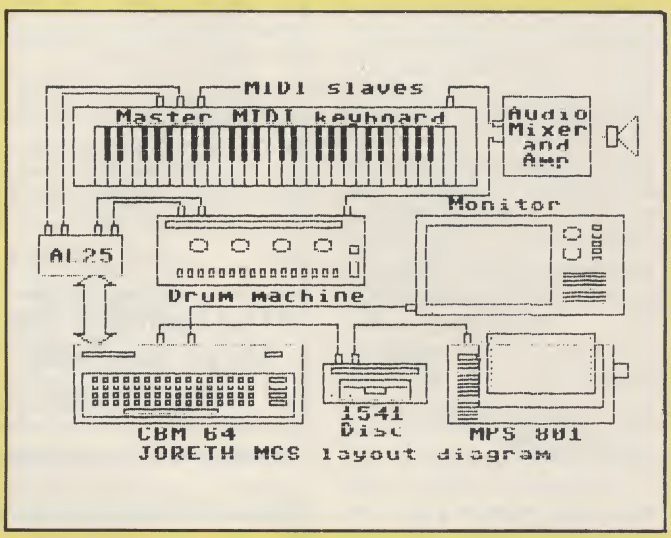
Other equipment to make full use of the MCS potential includes an MPS801 printer or equivalent, more than one MIDI synthesiser, an audio mixer and sound system, a drum machine (MIDI or non-MIDI) and a 64 cassette recorder.

To set the system up, insert the edge connector of the AL25 MIDI-Link into the user port. Then, using normal 5 pin DIN to DIN leads, connect the MIDI IN port of the AL25 to the MIDI OUT of the synthesiser. Connect one of the three MIDI OUT ports on the AL25 to the MIDI IN port of the synthesiser.

There are also sockets on the AL25 for control and synchronisation with non-MIDI drum machines and sequences.

"An unlimited number of synthesisers can be linked"

If you are lucky enough to own several synthesisers, a 'daisy chain' set-up can be achieved with standard cables. An unlimited number can be linked this way, although the MCS will transmit no more than eight separate monophonic or polyphonic parts.



JORETH MCS layout diagram

A nice feature is the ability to switch between MIDI channels for any part, allowing separation of independent parts to different keyboards with different sounds, or layering by assigning two different keyboards to recieve on the same MIDI channel, but set to different sounds.

Useful prompts are indicated on-screen. A metronome flag is represented by a flashing M in the top left hand corner of the screen, indicating the current metronome rate. You have the option of changing the metronome rate or turning it off altogether.

In the top right hand corner of the screen is the performer flag (shown by a P). A flashing P indicates that a tune, be it a sequence or component of a song, is being performed. A steady P shows that the performance is complete. This function is particularly useful in the case of a tune which may have a silent passage within it.

"Useful on-screen indicators"

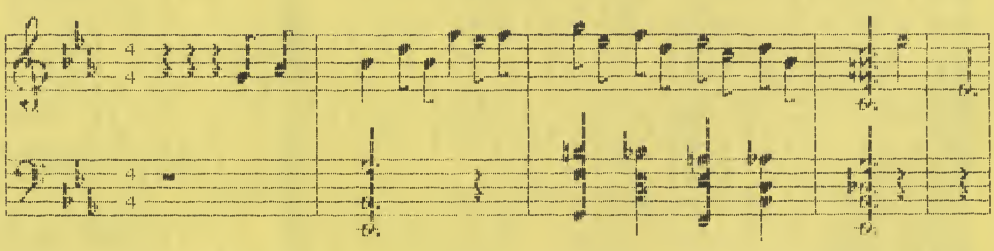
Other on-screen features are: status reports for synchonisation with both external equipment and non-MIDI equipment; tune/part column headers for the eight polyphonic or monophonic parts at your disposal; part, to indicated which parts (from 0–7) have been completed in a current tune; and transpose, giving the user the opportunity to transpose any parts on playback.

Once you've got the system set up and are familiar with its operation, the next thing you will probably want to do is record something. Select RECORD using the cursor, enter PART number and you can record in two ways. Firstly, you can record the first part for a new tune without accompaniment. Alternatively, you can overdub while playing previously recorded music.

You can record either in real time or in step time. On-screen prompts lead you through these stages and usually require either a Y (yes) or N (no) answer or the entering of a number.

Composer files can be entered by typing directly from the 64's keyboard. Here you will need to refer to the table of note length values and qualifiers, and the list of commands for MIDI control, all found in the accompanying manual.

To input music to composer files, again refer to the note length table and enter the required values and qualifiers. Type a full stop and then type the note to be sounded on the MIDI keyboard along with an octave number for each note.



An example of the MCS score facility.

A very big plus for this system is the score feature. This enables you to plot the current composer file with conventional music notation, both on screen and to a suitable printer.

The procedure is as follows. Key S for an entry stave and enter a part number to start the screen display. Music is plotted in sections and when the screen is full it automatically scrolls to the end of that line (each line is actually two screen widths), before returning to 'start of line'.

"Plotting conventional music notation"

Bar lines are inserted and numbered automatically. Each stave doesn't necessarily contain a complete number of bars. If the current stave includes an incomplete bar, the letter I appears top left as an indicator.

The Joreth Music Composer System does live up to the manufacturers claims of being easy to operate and the accompanying manual is substantial and informative, offering sound advice and useful tips.

Anyone wanting to achieve professional musical results with their 64 should consider this package seriously. Obviously you will achieve more impressive results if you have all the additional equipment listed at the start of this feature, but even the basic set up gives remarkable results.

Contact: Joreth Music, 43 Brewers Lane, Badsey, Evesham, Worcestershire WRU 5EU. Tel: 0386 831615.

Playalong with Commodore

While there are now many programs available to teach people how to read and write music, I'm sure that many people — like me — would like to be able to sit at a keyboard and quickly learn how to play a recognisable tune, albeit simple, without studying scales, etc.

Commodore's second venture into the world of music is designed to do just that. Hot on the trail of the company's Music Maker (reviewed in our March issue) comes Commodore's Playalong Albums. There are three available initially: Classics, Pop Hits and Beatles. All are available on cassette or disk for the 64 at £9.99, and feature 12 well-known tunes of the relevant categories. We looked at the Classics album which features: Capricceio Italian, Cabricae, Concerto No 1 B Flat Minor, Dance of the Reed Flutes, Emperor Waltz, Hungarian Dance No 5, In The Hall of the Mountain King, Minuet in G — Beethoven, Night Music Serenade, Romeo and Juliet, Sonata in C Major, and Toreador's Song.

The program is basic and aimed at the non-player. You will need the Music Maker package (£29.95) before you can use the Playalong albums. Music Sales designed the programs for Commodore and selected tunes from their vast catalogue, with a melody line which is easy to play, but correct.

After loading — a brief process — select automatic from the menu using the 64's command keys and the tune of your choice plays to you. Switch to rehearsal mode and the fun begins! An animated finger points out each note on the on-screen keyboard and you must press the corresponding key on the Music Maker keyboard overlay. Press the wrong key and nothing happens.

Incorporating the features of Music Maker, one of the nice touches to this package is the fact that the harmony line keeps time with your playing. Hesitate and the harmony hesitates with you.

"The harmony line keeps time with your playing"

A single key play option, using any key, teaches you the importance of timing. You can alter speed from between +9 and −9. Graphically speaking, Commodore has chosen a clear uncluttered approach to the screen. There are, however, two exceptions. One graphics mode represents the voices (there are three) with colourful musical notes dancing along the screen as tunes play back.

A second graphics mode has three pulsating blocks illustrating pitch.

When you feel confident in your musical talents, a performance mode enables you to play the melody line to the accompaniment of the harmony.

Another option is concert mode. This not only plays back all 12 tunes automatically, but gives you the option of deciding which order you wish the tunes to play back in.

With the number of synthesisers on the market increasing — and their price decreasing — Commodore has had the foresight to incorporate a MIDI option. You can buy a MIDI interface for around £30. With this you can interface any combination of MIDI instruments for some really interesting results.

As you can see, for £9.99 (following the initial outlay of £24.95 for Music Maker) you're getting a very comprehensive package. But does it do its job?

Well, it's certainly 'user-friendly', as they say in computerese. I had no difficulty in pressing the right keys and quickly picked up the basics of the tune. Not having too much of a classical bent, I wasn't familiar with many of the tunes on this 'album'. If we had had the Beatles Playalong album in, I think my progress would have been even quicker.

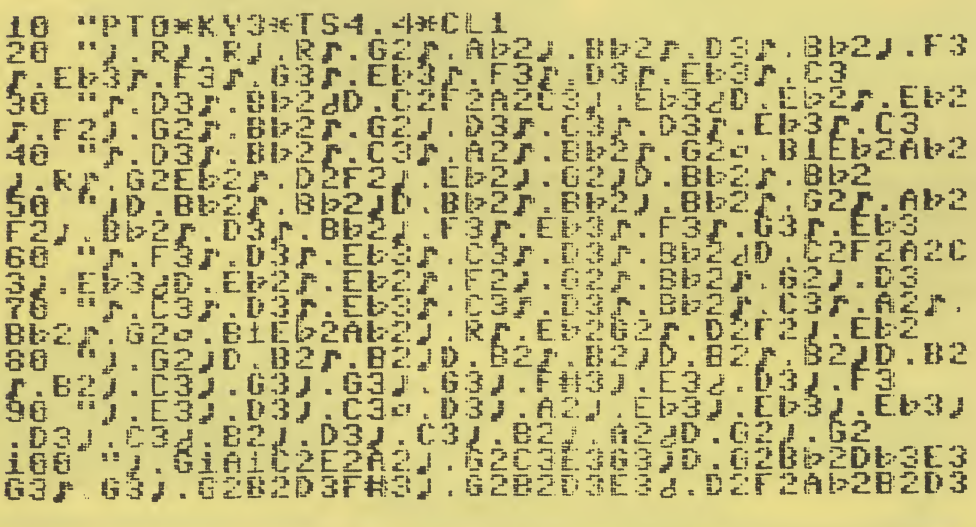
As we were having a sneak preview of a pre-production copy, we weren't able to judge the manual which will come with the albums. However, we are assured that it is a comprehensive music book/user guide which contains all the tunes in full musical notation. There is also a section explaining musical terms.

I loved the concept of the albums and was reluctant to stop playing with it. I am also waiting with great anticipation to receive the other two albums. Further albums will be launched, probably at the rate of three every two months.

If you want to impress your friends with newly found musical talents, buy a Playalong album — it's well worth a tenner!

Contact: Commodore (UK) Ltd, 1 Hunters Lane, Weldon, Corby, N. Hants. Tel: 0536 205555.

Example of COMPOSER text



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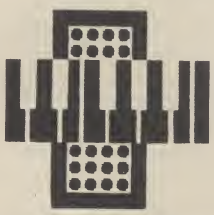

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Dear Editor...

Dear Editor,
I write to you with the following problem. I have had a VIC-20 for quite some time and have added to the standard machine with the following items:

16K switchable Rampack (by Stonechip)
-slot motherboard (by Zero Electronics)
Machine Code monitor (BUTIPLUS by Audiogenic).
Commodore 1541 disk drive
Seikosha GP 100 VC printer

The problem is that I have now purchased a Commodore 64 and passed the VIC onto my children. Could you tell me if it is possible to link both computers to the disk drive and printer to avoid disconnecting every time?

I have also read an article about linking the PET to the VIC by the user port. I wonder if this is possible with the VIC and the 64 as I would like to be able to use the machine code monitor of the VIC to modify the memory of the 64?

H Hoskitt
Wetherby
W Yorkshire

Sorry to disappoint you, but the short answer to both your questions is no!

The VIC and the 64 have completely different memory locations, making your suggestion impossible.

Dear Editor,
At a time when most people seem keen to sell you various programs and not support them, may I put a good word in for PSS (Personal Software Services).

I received via the Home Computer Course their CHAMP assembler/monitor etc, free. Since purchasing a disk drive, I asked if there was any way to use the program, but saving and loading to disk.

Within a few days I received a letter explaining what locations to change and now have an excellent assembler and disk-based ... and all FREE!

Well done PSS!

P Steel
Gorseinon
Swansea

Dear Editor,
I am investigating the feasibility of creating a network system within the Merseyside Youth Training Scheme. The scheme operates from several different bases within the Liverpool area. Each one of these sites will shortly have its own Commodore 64 computer and a printer.

I would like to link these sites to our Head Office CBM64 in a master/slave arrangement. Ideally this should allow each site to access desk storage/software from the Head Office/Master site plus have the capacity to receive/transmit electronic mail and messages.

I would be most grateful of any information you can provide relating to this idea and its implications.

David Cobley
Computer Supervisor
Merseyside Youth Training
Liverpool

Dataview Wordcraft Ltd have a networking package called Hydra which sounds ideal for your requirements. One word of advice, though — your system would be far more efficient if you had one of Commodore's 8000 series computers (preferably the 8296D) as the control unit at your Head Office. The 1541 disk drive is not fast enough as a server and would not cope efficiently with sample handling.

You would need one Hydra board for each of your 64's: they cost £175 plus VAT each. Software comes with the Hydra, but you may need to write your own software depending on your requirements. This is not difficult, it simply requires each Basic command to be prefixed with N.

We don't have the space here to go into great details, but if you contact Dataview Wordcraft they will be only too happy to answer all your questions and advise you further.
Dataview Wordcraft can be contacted at:
Radix House
East Street
Colchester
Essex CO1 2XB.
Tel: 0206 869414.

Dear Editor,
I recently bought the MIKRO machine code assembly cartridge for the 64 and, from the assembly point of view, I am very pleased with it. However there seems to be one serious flaw. Whenever I try to run an assembly using Gxxxx, the screen comes up with garbage, and the music (which runs in interrupts) is about 1/5th the speed expected. Also the computer is trying to engage the tape motor. If I remove the cartridge and run the assembly under SYS(xxxx), my program runs perfectly well with the music at the correct speed and with no odd noises from the tape drive.

Have I got a faulty cartridge or does MIKRO have limitations in this respect?

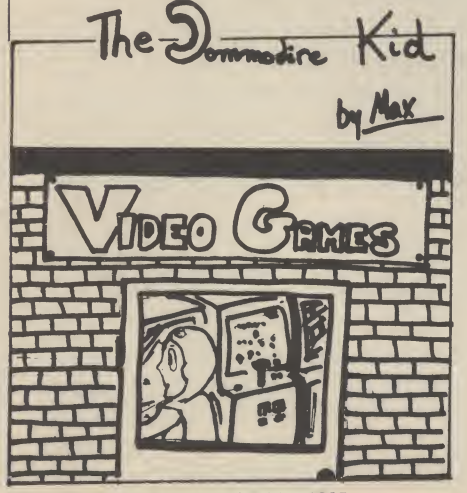
The program runs from $1200 to $1850, and I have reserved $6000 to $7FFF for the screen, copied ROM, user-defined graphics, music data, and other data.

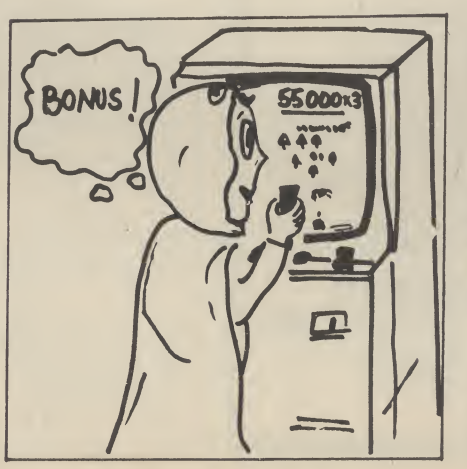
Peter Dennison
Swindon
Wilts

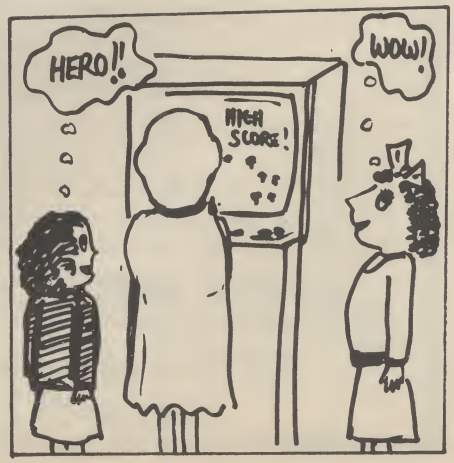
This is a problem that exists in all Commodore Machine Code monitors. The problem is that commands of the processor registers are stored by the monitor in the Basic input buffer. When the monitor is first called the register displayed on the screen are not the actual register values, but the byte from the input buffer. When you enter MIKRO monitor by typing TIM, the values displayed for the starts register is $4D (the ASCII value of 'M'). This value implies that the processor is in decimal mode and that the interrupts are disabled.

When you type command to run a Machine Code program it takes the table register values and puts them in the processor registers. Therefore if you type command without correcting the false values, interrupts will be disabled and the processor in the decimal mode and therefore the program will give peculiar results. The solution is to type the short form of TIM, T shift I, which puts in equally false values but a more sensible one of $00 into the starts register.

The problem described doesn't exist when the monitor is entering with a Break rather than a Call. Incidentally, this problem and is solution are described in Supersoft's latest MIKRO Assembler manual.







Dear Editor,
I recently purchased a 64 and with it, the Commodore 64 User's manual. At the back of the book there is a program called 'piano keyboard'. On completing this program, when I typed RUN I got "?SYNTAX ERROR IN LINE 190."

I have typed it many times and had a friend go over it with me, but still we can't see any way we have made a mistake. The line in question is:
190 S = 13*4096+1024:DIMF(26):DIMK(255)

I would be grateful if you could help me with this, I have been trying so hard to do this one program for ages.

Patrick Henneberry
London NW1

From your letter it would appear that you have typed in line 190 correctly, and on testing this program we can find no problems. It may be that you have a memory fault in your computer. Try listing the line — you may find that it doesn't list the same as you typed it in.

However, it is possible that a fault in memory could lie elsewhere. This sort of problem is hard to track down as nine out of 10 programs could work perfectly. If your problem is that of a fault in memory, it will require an engineer to solve.

Dear Editor,
A regular feature of most magazines dealing with the 64 seems to be desperate pleas from readers having problems with the Check Disk program supplies with the 1541 disk drive, which, when left to do its business on a newly formatted disk, will still be plodding on several hours later — unless the drive has by that time overheated and given up! The commonest reply seems to be 'don't use it'.

There is, however, a simple cure. Lines 150 and 170 refer to line 85 — these should instead refer to line 90 to ensure that the program runs correctly.

In addition to this, although the instructions seem to suggest otherwise, the program may be used on partly used disks without ill-effect to the files held on them — only 'free' blocks will be checked (NB random files will however be overwritten should these be present).

Here's hoping that this advice saves a few 1541's (and their owners) from a terrible form of torture.

Steve Gold
Warley W Midlands

Expanded

It was inevitable. Sixteen K of memory just isn't enough for most people. And now at least two companies have already developed expansion packs for the C16.

Micro Component Trading Co of Norwich has a 64K Ram extension that runs on the C16 and Plus/4 and is totally compatible with software on those machines. It requires no modifications of the main printed circuit board and Micro Component says users should have no trouble fitting it to their computer.

It sells for £59.95 and comes with instructions. It leaves 60671 bytes free in text mode and 48381 bytes in high resolution graphics mode.

Audiogenic showed an unfinished version of its 16K Ram pack for the C16 at the LET Show. A price hadn't been set at press time, but the company estimates it will sell for around £30.

Contacts: Micro Component Trading Co, Group House, Fishers Lane, Norwich NR2 1ET. Tel: 0603-666966; Audiogenic, 39 Suttons Industrial Park, London Road, Reading, Berks RG6 1AZ. Tel: 0734-664646.

Plus/4 business

Anagram Systems has converted its four business packages for use on the Plus/4.

They include Sales Ledger, Purchase Ledger, Cash Book and Stock Control and are designed primarily for the small business owner. Anagram says the new versions are more effective on the new machine than they were on the 64, the machine for which they were first created.

Costing £75 incl VAT for each package, they are best used for the business person computerising for the first time.

Contact: Anagram Systems, 60A Queen Street, Horsham, West Sussex RH13 5AD. Tel: 0403-59551.

Games, graphics

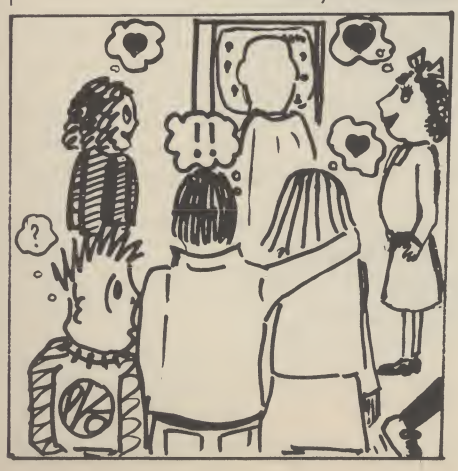
One of the larger supporters so far of the C16, Microdeal has announced five games for the new machine.

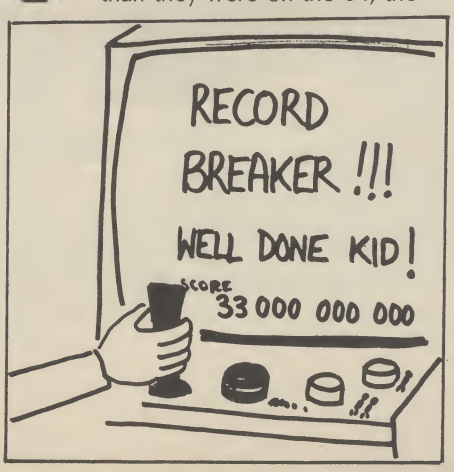
Cuthbert Enters The Tombs Of Doom, Cuthbert In Space and Arena 3000 are conversions from the C64 and written in 100 percent machine code. Each retails at £6.95. Microdeal also has two adventures written in basic. Williamsburg Adventure is set in the American colonial town with juicy characters like a mad butcher and the ghost of Bruton Manor. Mansion Adventure has you searching for a diamond. Each sells for £3.99.

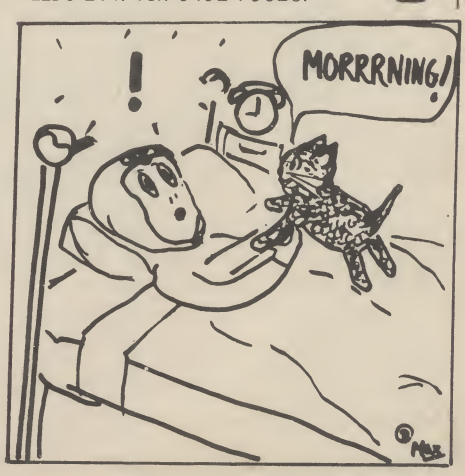
And the 16 finally gets a pac man game with Mr Chip Software's Pacmania (see review in Games Supplement). Pacmania and Olympic Skier each retail at £5.99.

Furthermore, mr Chip has released its Graphics Master program for the C16, allowing the user to re-define the computer's character set with the usual edit commands. The software capabilities include character scrolling, inverting and character rotation. Graphics Master is £7.50.

Contacts: Microdeal Ltd, 41 Truro Road, St Austell, Cornwall PL25 5JE. Tel: 0726-73456; Mr Chip Software Ltd, 9 Caroline Road, Llandudno, Gwynedd LL30 2TY. Tel: 0492-79026.







Book Review

Computer journalist Peter Arnott-Job evaluates a selection of newly-released computer books.

THE HOME COMPUTER WARS by Michael S Tomczyk, price £13.95 (hardback), £7.95 (paperback).

What is the secret of Jack Tramiel's success? How did he steer Commodore to the top of the league? The answer can be found in The Home Computer Wars but you have to look for it. You have to read between the lines.

The secret of Tramiel's success looks an awful lot like luck. But it could just as easily be an instinct for doing the right thing. You have to read between the lines because Mike Tomczyk is so involved with his subject and has such an obvious enthusiasm — or should I say love? — for all things Commodorian that it's difficult to see how he could possibly come to an objective critical assessment of the processes involved in the development of Commodore.

The first impression that the book gives you of the early days of Commodore is of a rather haphazard, chaotic organisation where job titles were vague and only one person — Jack Tramiel — really knew what was going on. There seemed to be no research and development programme. Instead the researchers and engineers were given a more or less free hand and would report back with what they'd discovered. That's how they developed the VIC chip — the breakthrough that was essential if computers were to make the transition from the school and laboratory (where the PET reigned supreme) to the home.

It seems that at first nobody realised the potential of the Video Interface Chip and Commodore tried to sell it to other companies. They failed so Jack Tramiel decided that if they couldn't sell it they'd use it themselves. Is that more luck than intuition? Or vice versa?

This is a fascinating and irritating book. Fascinating sometimes for the 'wrong' reasons. Reading it makes you realise what an impact Tramiel has on people and what a tremendous hold he maintains over them. It's almost as if he was regarded as something of a god within the company.

The blurb on the cover which describes this as a book about Jack Tramiel and Commodore is not really full enough. Home Computer Wars is really about Mike Tomczyk and his relationship with Commodore and with Tramiel. The author is the central character in the book and plays such a major role that you can't help wondering just how objective he's being.

There's something about The Home Computer Wars that makes you feel uncomfortable and it took me a while to figure out what it was. Then it clicked. There's a lot of talk about markets and masses but very little about the Commodore owner as a human being. If you want to know how a company can announce a machine and not have enough ready to satisfy demand or how a company can sell a computer at Christmas without one vital component — the Datasette — then read The Home Computer Wars. I couldn't help detecting a strong sense of cynicism. I felt that the customer was being regarded as a sucker, that the public was there to be exploited.

Those are a few of the reasons why the book is fascinating. Why is it irritating? The literary style is brash and harsh. It reads as if Raymond Chandler was writing comic strip captions. It's the sort of style that is typical of Americans writing about computers. It's slick and staccato, full of cliches and a sort of slick smartness that just doesn't come off. It's far too easy to try too hard to be clever only to make a fool of yourself with a literary faux pas.

Is The Home Computer Wars worth reading? The answer must be yes for those involved in the computer business, for Commodorians and for anyone interested in how American business sometimes works. It's a fascinating and enjoyable read even though it is, at times, irritating.

Contact: Holt Saunders, 1 St Anne's Road, Eastbourne BN21 3UN. Tel: 0323 638221.

ELECTRONIC MUSIC ON THE COMMODORE 64 by Mark Jenkins, priced £6.95.

This is a good introduction to music on the 64. The blurb states that the book explores the 64 from two viewpoints: 'that of the computer enthusiast interested in music, and that of the musician who feels that micros may have something to offer.' Three quarters of the way through the book I would have gladly fully endorsed the first point but seriously questioned the second.

For a home micro the 64 has marvellous sound capabilities, but as Mark Jenkins himself points out: 'there's nothing wrong with the SID chip — it's extremely versatile for a computer sound device — but, like the 64 itself, it's intended largely for games and has several musical limitations.' Exactly my point of view and the reason why I would have disagreed with the claim that the book would be useful to musicians.

Fortunately the book is rescued by the final few chapters which get into MIDI — Musical Instrument Digital Interface. Now you're talking! If you've ever seen — or should I say heard — a MIDI Synthesizer in action you'll know what I mean. It's at this level that serious musicians find it worthwhile getting involved with home computers and this part of the book convinced me that the claim in the blurb was, after all, well founded.

Sunshine books are usually a reliable buy. They are well researched and well put together with plenty appendices (it just wouldn't be a computer book without at least half a dozen appendices!). I like the practical, no-nonsense approach you usually find in their books. One slight criticism of Electronic Music on the Commodore 64 is that the author seems to get a little carried away in the last few chapters and the uninitiated reader might feel himself decaying under the sustained attack of technical data. Perhaps it's inevitable when you're talking about such a highly complex subject.

Contact: Sunshine Books, 12/13 Little Newport Street, London WC2 7PP.

25 ADVANCED GAMES FOR THE COMMODORE 64 by Larry Hatch, price £18.35.

Zap, zilch, zork, zymurgy. These are the last four words in the index of 25 Advanced Games for the Commodore 64. The only relevance they have is to indicate that this book is one of those that bothers with an index — there are far too many without an index — and I couldn't resist using them as an attention grabber. A cheap trick, perhaps but one that's prevalent throughout computer writing. It's almost as if the writers have such little confidence in the interest that readers have in the subject matter that they have to work hard to attract and keep their attention. Sometimes the strain shows, and the result is a stilted and brash style that's painful to read.

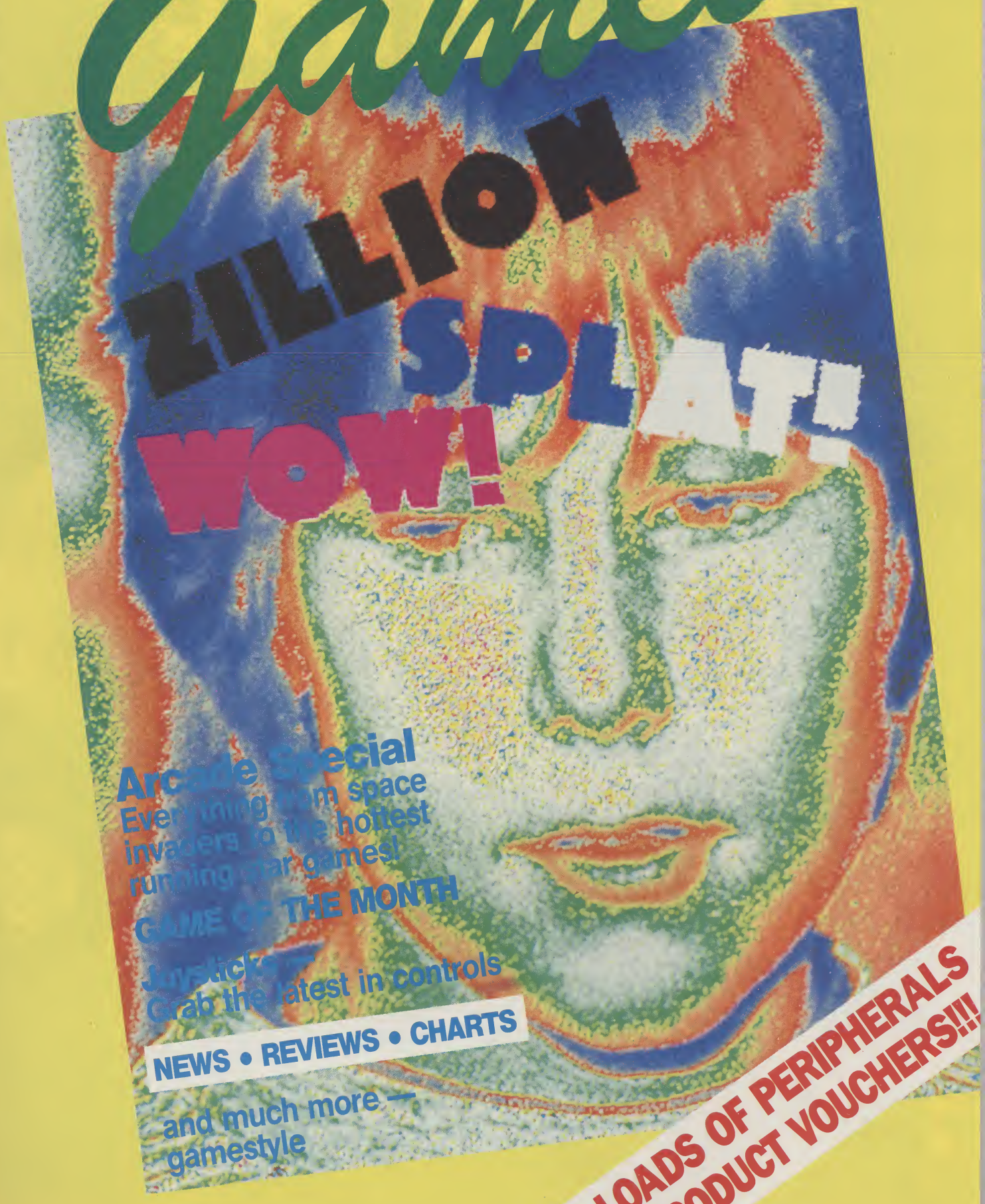
25 Advanced Games for the Commodore 64 almost, but not quite, falls into the trap. The explanations of the programs are readable and understandable but perhaps they don't quite go far enough. Any why on earth did they use such appalling screen shots of the games in progress? Really they'd have done much better leaving these photographs out altogether. Descerning readers browsing in a bookshop might well reject the book on the grounds that the rest of the book is as bad as the photos. A reasonable assumption but not a fair one.

The games themselves are interesting without being sensational and really aren't all that advanced. Even so this is one of the better examples of a games programming book.

Contact: Prentice/Hall International, 66 Wood Lane, Hemel Hempstead, Herts HP2 4RG.

COMMODORE Games

MAY ISSUE 1985



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5	Lords of Midnight	NEW	Beyond	9.95
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7	Daley Thompson's Decathlon	DOWN	Ocean	7.90
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NEW GAMES RELEASES

ARCADE GAMES

Aqua Racer and **Tazz,** (£6.99 cassette), released for the 64 by Bubble Bus Software, 87 High Street, Tonbridge, Kent TN9 1RX. Tel: 0732-355962.

Gryphon, (£7.95 cassette, £12.95 disk), released for the 64 by Quicksilva Ltd, 13 Palmerston Road, Palmerston Park House, Southampton SO1 1LL. Tel: 0703-20169.

Master Of The Lamps, Rock 'N' Bolt and **Great American Cross Country Road Race,** (£10.99 cassette, £19.99 disk); all released for the 64 by Activision UK Ltd, 15 Harley House, Marylebone Road, London NW1. Tel: 01-486 7588.

Mama Llama, (£7.50 cassette), released for the 64 by Llamasoft Software, 49 Mount Pleasant, Tadley, Hants RG26 6BN. Tel: 07356-4478.

Airwolf, (£7.95 cassette), released for the 64 by Elite Systems Ltd, 55 Bradford Street, Walsall, England. Tel: 0922-611215.

Up 'N' Down and **Buck Rogers,** both from Bally Midway, (£9.95 cassette, £12.95 disk); **Conan,** (£14.95 disk only); **Quasimodo** from Synsoft, **Pole Position** racing simulator, **Super Huey** flight simulator and **Doughboy,** (£9.95 cassette, £14.95 disk); all released for the 64 by US Gold Ltd, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4Ly. Tel: 021-359 3020.

ADVENTURE GAMES

Frankie Goes To Hollywood (£9.95 cassette), scheduled for May release for the 64 by Ocean, Ocean House, 6 Central Street, Manchester M2 5NS. Tel: 061-832 6633.

Castle Of Jasoom and **Dungeons Of Ba,** (£12.95 disk only), for the 64 from Accelerated Software Inc. released by Quicksilva Ltd, 13 Palmerston Road, Palmerston Park House, Southampton SO1 1LL. Tel: 0703-20169.

The Tracer Sanction and **Mindshadow,** (£19.99 disk only), released for the 64 by Activision, 15 Harley House, Marylebone Road, London NW1. Tel: 01-486 7588.

The Ket Trilogy, (£9.95 complete on cassette), released for the 64 by Incentive Software Ltd, 54 London Street, Reading RG1 4SQ. Tel: 0734-591678.

Velnor's Lair, (£2.99 cassette), released for the 64 by Atlantis Software Ltd, 19 Prebend Street, London N1 8PF. Tel: 01-226 6703 or 01-354 1437.

Emerald Isle, (£6.95 cassette), released for the 64 by Level 9 Computing, 229 Hushenden Road, High Wycombe, Bucks HP13 5PG. Tel: 0494-26871.

Elidon (£9.95 cassette), released for the 64 by Orpheus Ltd, The Smithy, Unit 1, Church Farm, Hatley St George, Nr Sandy, Beds SG19 3HP. Tel: 0767-51481/91.

Tir Na Nog, (£9.95 cassette), released for the 64 by Gargoyle Games, 74 King Street, Dudley, West Midlands DY2 8QB. Tel: 0384-238777.

Death Race, (£1.99 cassette), for the VIC 20 plus 8K, and **Super Breakout,** (£1.99 cassette), for the unexpanded VIC 20, both released by Atlantis Software, 19 Prebend Street, London N1 8PF. Tel: 01-226 6703 or 01-354 1437.

Match Fishing, (£7.95 cassette, £11.95 disk); **Blagger Goes To Hollywood** and **Fistful Of Fun** (five titles combined), £9.95 cassette, £11.95 disk), both released for the 64 by Alligata Software Ltd, 1 Orange Street, Sheffield S1 4DW. Tel: 0742-755796.

Operation Swordfish, (£9.95 cassette, £11.95 disk), released for the 64 by British Software, 85 Greenway, Chislehurst, Kent BR7 6DL. Tel: 01-467 0365.

Rocketball, (£7.95 cassette); **Krazy Kar** and **Jouste** (£6.95 cassette); all released for the 64 by IJK Software Ltd, Unit 3C Moorfields, Moor Park Avenue, Bispham, Blackpool, Lancs FY2 0JY. Tel: 0253-55282.

Andromeda Jet Pack (£5.99 cassette), for the 64; **Starzone** and **Galactica** for the 64, and **London To Paris Air Race** and **Sea Quest** for the VIC 20 plus 16K (each at £1.99 cassette); all released by Century City Software UK Ltd, 99 High Street, Dudley, West Midlands DY1 1QP. Tel: 0384-57077.

Daley Thompson's Supertest, Baseball and **Match Day** (£7.95 cassette), all released for the 64 by Ocean, Ocean House, 6 Central Street, Manchester M2 5NS. Tel: 061-832 6633.

Confuzion, (£6.95 cassette), released for the 64 by Incentive Software Ltd, 54 London Street, Reading RG1 4SQ. Tel: 0734-591678.

Squash (£7.95 cassette), released for the 64 by New Generation Software Ltd, The Brooklyns, 15 Sunnybank, Lyncombe Vale, Bath BA2 4NA.

Ice Palace, (£7.95 cassette), arcade adventure for the 64; and **Tower of Evil** (£5.95 cassette), arcade game for C16. Also, to be available in April are **Mad Doctor** (£7.95 cassette) action adventure for the 64; **Fourth Encounter** for VIC 20 and two unamed titles for the 64 in a new £2.50 budget range called Sparklers. All released by Creative Sparks, First Floor, Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NU. Tel: 0252-543333.

Firebird captures rights to Elite

The 64 will play host to the popular home computer game Elite, which sold more copies than any other game on the BBC micro.

British Telecom's software arm, Firebird, acquired the rights from Acorn. The Commodore version was nearly completed at press time. It will have some enhancements, of course, since there's more memory to work with, but one Firebird programmer says it is "entirely faithful to the BBC disk version." That's a good start since it apparently impressed about 25 per cent, or 100,000, BBC owners enough to buy it.

Elite is a complex arcade-type game that has the player responsible for buying food, textiles, wine, narcotics and (horribly so) slaves to ship to various planets of the universe. But the game doesn't advocate slavery and selling narcotics since both of those activities draw the immediate attention of the police.

There's a description of each of the 2,040 planets in Elite's solar system. When you travel in your spacecraft you have views to the front, rear, left and right and capability of going into hyperspace. If you're shot down you become rubbish and the collectors come after you.

The stages of your progression are harmless, mostly harmless, poor, average, above average, dangerous, deadly and Elite. Firebird warns the latter is "almost impossible" — a juicy challenge for any of you courageous types. Your chance to prove them wrong will cost, in monetary terms £14.95 on tape and £17.95 on disk when the game's released. We'll keep you informed.

Contact: Firebird Software, Wellington House, Upper St Martin's Lane, London WC2H 9DL. Tel: 01-379 6755/5626.

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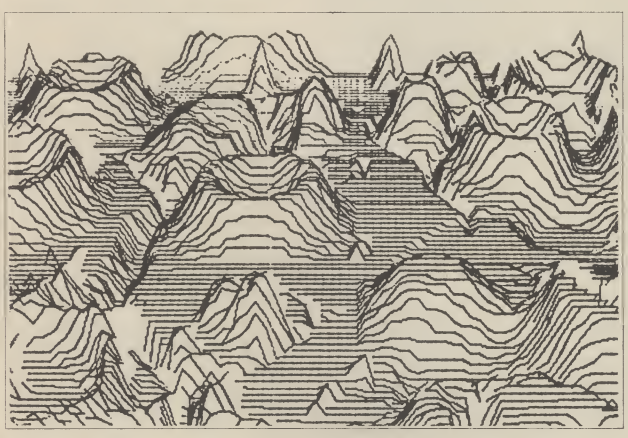

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Companies announce contest winners

Considering the thousands of competitions, drawings, contests, etc held by various software companies, the number of announcements regarding winners seem to be less frequent.

But two companies, Ariolasoft and Virgin, recently announced two very lucky winners. Forty-year-old Leeds sales clerk Ian Etheridge got a Commodore SX-64 portable computer worth more than £800 when he entered a draw with two coupons from Ariolasoft games.

Ariolasoft is running a prize draw each month until May and anyone buying an Ariolasoft title can win by sending in a completed coupon.

Virgin Games gave away a weekend for two in New York travelling, of course, via Virgin Atlantic airlines. The winner was Leslie Loftus of Harlow. The competition involved finding the hidden prize beneath Stonehenge, one of the scenes in Virgin's latest arcade adventure Sorcery.

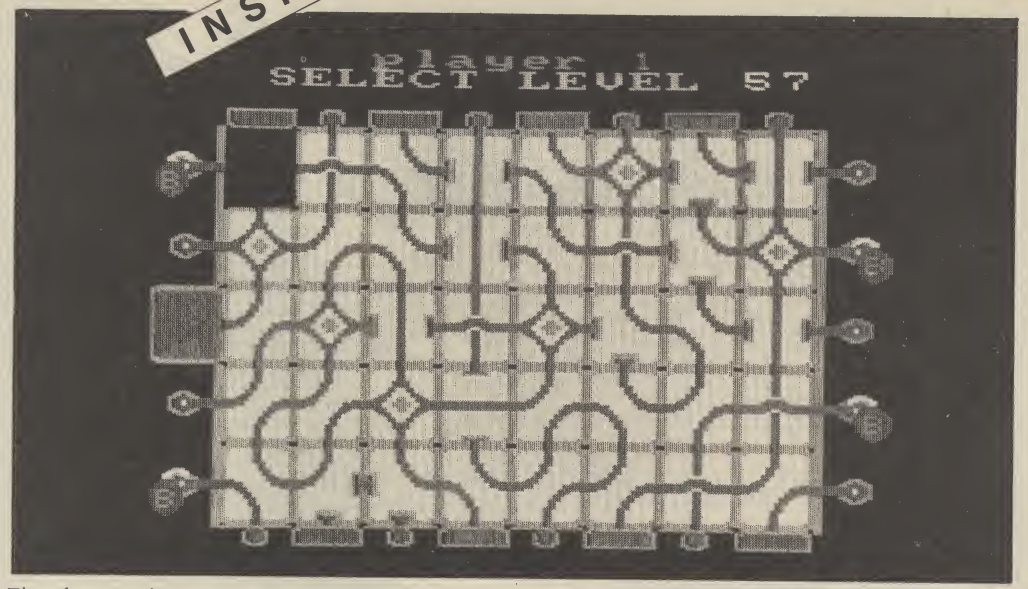
Mystery land of Celtic fantasy

The name of the game is Tir Na Nog. But what does it mean?

Software house Gargoyle Games says the phrase is Gaelic meaning Land of Youth or the Celtic Otherworld. It forms the basis for this arcade adventure about Cuchulainn, the legend's hero, and his exploits in Tir Na Nog with its Plain of Lies, Lava Flats and Forest of Cern.

The fantasy-based game retails for £9.95 on cassette only and comes with a booklet and map of the Land. Gargoyle Games says it is working on the "prequel" which concerns Cuchulainn's early years. It sems a rather backwards way of doing things, but who are we to question why?

Contact: Gargoyle Games, 74 King Street, Dudley, West Midlands DY2 8QB.



The fuse is lit and off you go! Incentive's latest release Confuzion tests the player's sense of perception by making him move the blank block (or a filled block, depending how you look at it) to connect the proper fuse wires. At a price of £6.95 Confuzion offers 64 levels of play to music by a group called Private Property. (See new releases).

War of worlds in games software

Argus Press Software will be handling production and marketing of all future titles from Lothlorien, the well-known software house that has produced some excellent war games.

"As we wanted to move into wargaming ourselves, we didn't feel we could do any better than line-up with the No 1 company," an Argus spokesman says. The company had considered launching its own line of computer wargames this Spring.

The arrangement is for a trial period at first with the first release to be a combat simulation set in late World War II.

Angling on dry land

Spring is here and the fishing season is not far off. In fact it opens 16 June, the same day Alligata has scheduled the release of Jack Charlton's Match Fishing.

The new computer game adds yet another sport to the range available. Alligata says the game's creators have taken the advice of former soccer player and still-avid angler Jack Charlton in combination with their own fishing and computer knowledge to design the game.

Match Fishing, who's namesake conducts regular television programmes on fishing, involves strategy, chance and skill. It can be played by several users at a time and will be released in conjunction with a board game version. The retail price of Match Fishing will be £7.95 cassette and £11.95 disk.

Contact: Alligata Software Ltd, 1 Orange Street, Sheffield S1 4DW. Tel: 0742-755796.

Venturing into adventures

Activision is shedding its arcade image by introducing two adventure games for the 64.

The Tracer Sanction and Mindshadow are both based on what the company calls "living computer novels" and are available only on disk at a retail price of £19.99.

In The Tracer Sanction the player is a top agent for the Stellar Intelligence Agency on the trail of the galaxy's most dangerous criminal, "The Wing." Mindshadow takes you, with no memory and no past, to a deserted beach where you must discover your identity.

The company also has started Activision Software Club News, a magazine available to anyone who writes or phones Activision. Each issue reveals the company's latest titles along with news, articles and reviews of interest to 64 owners.

Contact: Activision UK Ltd, 15 Harley House, Marylebone Road, London NW1. Tel: 01-486 7588.

The story that (almost) never ends

A computer adventure based on the international best-selling book "The Neverending Story" is the latest project taken on by programmers at Ocean.

Expected to be released for the 64 around the beginning of June, the game follows the story of the musical adventures of Bastian Balthazar Bux. He's a little boy trying to escape from the merciless teasing and abuse of his classmates. So Bastian steals a book and goes off to a corner to read. He finds himself so absorbed in it that he's projected into it as, naturally, the hero in the land of Fantastica.

Ocean acquired the rights from Warner Brothers, which will be releasing the film in Britain at Easter. It was filmed at the Bavaria Studios in Munich and the company says it already has grossed more in Germany than "Gremlins."

Ocean says the software probably will be accompanied by the book, written by Michael Ende, and will retail for something around £15 on cassette, slightly more on disk.

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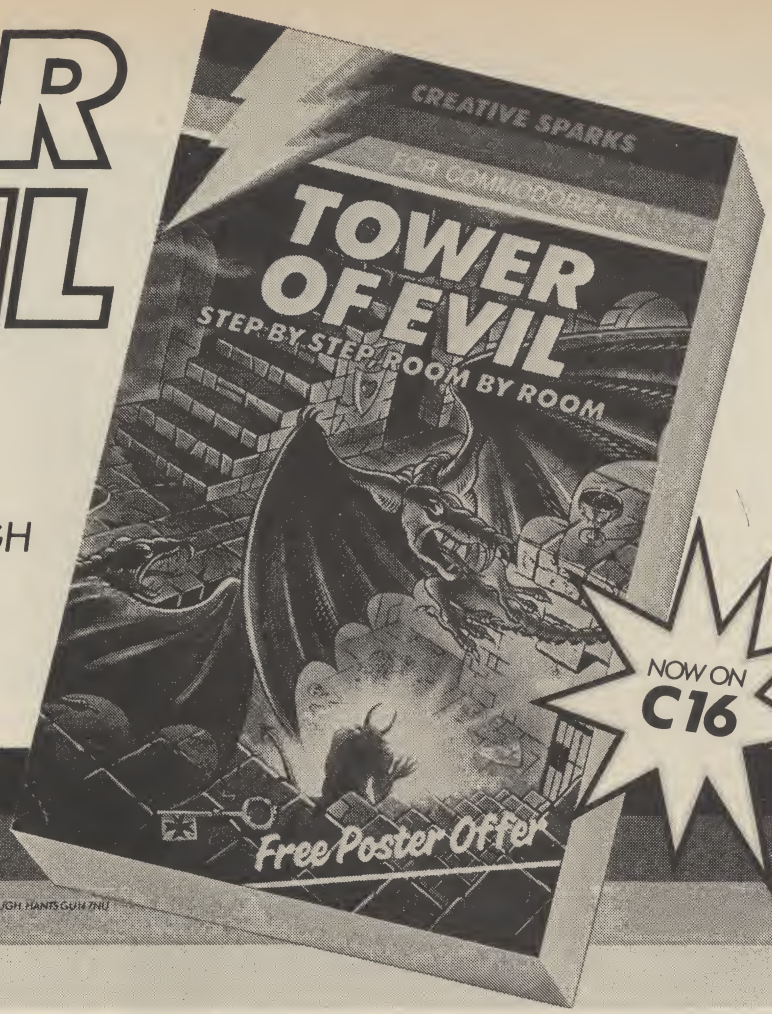

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FREE joysticks and voice synthesisers

From Zombies to Empire leaders, murder to peace missions ... all are ingredients of Ariolasoft's range of American chartbusting software for the 64.

Music and arcade games are the ingredients of this issue of CCI and in line with these two themes are the prizes given by Ariolasoft for our easy competition this month.

There are two Currah Speech 64 voice synthesisers for the first two correct entries to reach us, and a Boss joystick each for the next four correct entries. Fifty runners up will each receive one of Ariolasoft's discount vouchers to give them a head start in getting a discount off peripherals.

These vouchers can be found on every Ariolasoft program for the 64. Three vouchers entitle you to £5 off a Boss joystick; five vouchers — £10 off a Currah Speech 64 voice synthesiser; and 10 vouchers — £50 off a Commodore 1541 disk drive.

The Puzzle

On this page is a string of letters. Your talk is to unscramble this list to find the titles of four Ariolasoft games. Every letter seen here is used ... but just once. For example, you will need three A's, two B's, etc.

If it all looks a bit bewildering at first, here's a little clue: one of the letters only appears in one of Ariolasoft's titles. Find that title first and you'll be well away.

The Games

Choplifter!
Lode Runner
Spelunker
David's Midnight Magic
Operation Whirlwind
Raid On Bungeling Bay
Hard Hat Mack
Murder on the Zinderneuf
One-on-One
Realm of Impossibility
Archon
M.U.L.E.

Unscramble the following letters to make up four Ariolasoft titles:

AAA BB C DDDD EEEEEEE F GG HH III LL M NNNNNNNNN OOOO RRRRRRR T UUUU Y Z

The hidden titles are:
1
2
3
4

Name:_____

Address:_____

What first prompted some bored programmer to turn a number and text-crunching mainframe to leisure pursuits? Given that the only output of those leviathans was a teletypewriter, the first game was probably a simple question and answer affair.

Main-frames are used for business and other simulations, so it may have been an early version of *Kingdom*, in which you manage resources year by year on the basis of the effects of previous management and natural disasters. But that game theme is scarcely gripping and it can't have been long before the vital elements of pursuit and destruction were brought in.

One of the first of the new genre was *Hunt The Wumpus*, a primitive text-adventure in which you moved from cavern to cavern, with messages as to the nearness of the Wumpus appearing from time to time. You shot arrows into caverns in the vain hope of hitting the beast. Then there was *Star Trek*, again with printed output, but with a science-fiction theme: space — the final frontier: the goal the destruction of the invading Klingon hordes. But the first real adventure must have been Willie Crowther and Don Woods' *Adventures*, quickly followed by Scott Adam's *Adventureland*.

Zapping the universe

It wasn't until the introduction of cheap VDUs that computer games really took off in the form of arcade machines. The first attempts could be seen competing in the arcades with pinball tables and one-armed bandits, simple *Breakouts*, or two player bat 'n ball jobs. It's interesting to reflect that you can now buy pinball games for your micro — *Pinball Construction Set*, *David's Midnight Garden* and many others. There are computer fruit machines, snooker, billiards, you name it, someone's programmed it.

It wasn't long before arcade games improved in leaps and bounds, and dedicated video processing chips allowed programmers to experiment with many different games types; platforms, mazes, racing games and the ever-popular shoot-em ups became faster and more colourful. Each type of game has developed considerably from its origins, and in some cases themes have split from a mainstream and merged later. Single screen platform games grew into monster epics. At first it was just a case of zap the aliens, then repeat the screen with more and faster invaders. Now it's a question of different styles of play for each screen, and each has to be mastered to progress.

The early *Space Invaders* soon gave way to *Scramble*, *Defender*, *Up and Down*, *Star Wars*, *Pac-Man*, *Buck Rogers* and

CH!!

He slimed me!

Zaxxon, and most of these are available in slightly tamer versions on home micros.

Worthy of mention are *Planetoids, Invasion Of The Body Snatchers, Cavern Fighter, Penetrator, Snapper, Skramble*, the list is a long one.

Platform games in the home owe a lot to *Manic Miner*, and its follow-up, *Jet Set Willy* proved equally popular and both spawned many clones. Maze and platform games have similarities, and with the development of more sophisticated programming techniques, spin-offs from CAD-CAM, it became possible to offer a hero's eye view of the scene. Publishers still see some mileage in the 3D maze format and the type has a wide range of quality, from the rather simple to Novagen's superb *Encounter*, Quicksilva's *Ant Attack* and *Zombie, Zombie*, and Ultimate's *Knight Lore* and *Alien 8*. Perspective transformation became a catch-phrase and rotating wire-frame spaceships appeared. It's still a popular medium — witness the many variations on *Battlezone*.

"Dominant space themes"

Arcade machines were fairly well established by the time the first micros (Commodore PETs, UK101s, Nascoms, etc) appeared in the UK and arcade machines have always been a major source of inspiration for home computer games. An interesting question is why there's such a dominant space theme, defense of the home planet and all that. Perhaps the great USA/USSR space race still figures strongly in the public mind, or perhaps it simply provides a vehicle for the derring-do Biggles spirit. Then again, it's easier to imagine vague blurred shapes as alien fighters than say, microbes, and space is more romantic than biology, but science fiction pulp has a lot to answer for.

The space theme and the control of a moving vehicle led to the introduction of flight and other simulators. Commercial and military projects fired the imagination of home computer programmers. Some flight simulators offer very little: simple displays, limited instrumentation and poor response are frequent problems. Among the best for the 64 are *Solo Flight* (Microprose), *Interdictor Pilot* (Supersoft) and *Flight Simulator II* (Sublogic), and *Fighter Pilot* (Digital Integration). It's still a very popular game type. Mirrorsoft is about to release *Spitfire 40* for the 64.

The machines range from WW1 biplanes, and Boeing 737s to jet fighters and yet-to-be-designed space cruisers. Many of the programs include some battle element — something to look forward to when you've got the hang of the controls, or tire of take-off, navigation and landing. And of course there are many games in which flight simulation takes a minor role. *Elite* (BBC, CBM 64) or *Star Trader* (Spectrum) offer some limited flight in a wider scenario of interplanetary trading. *Codename Mat* combined the best of two worlds — it's real-time *Star Trek*. And beside flight simulators there are a number of 'Air Traffic Control' simulators.

"Computers process variables quickly"

Computers lend themselves to games like these because they can process many variables very quickly. Couple that facility with a little imagination, throw in some ideas from the fertile ground of board games and you get military strategy games. Most of the better ones feature complex graphics, like the excellent *Combat Leader* from Strategic

Ghostbusters illustration courtesy of Columbia Pictures Inc; on this page courtesy of Firebird

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CRASH Readers Awards 1984 Winner

Illustration courtesy of Mogul

Simulations. In the UK we have MC Lothlorien producing strategy games, and PSS is likely to extend its range in 1985. Other current games in this area include *Combat Lynx*, and *Battle For Midway*.

Other simulations borrow from arcade machines like Atari's *Pole Position*, and the racing car/bike theme has been widely exploited in the past year or so — *Death Chase*, *Turbo 64*, *Enduro*, *Pit Stop*, *Full Throttle*, *3D Grand Prix* and *Chequered Flag* are just a handful of the available titles. Such games aren't restricted to the circuit. There's *Chariot Race* for the unexpanded VIC 20. *Aqua Racer*, and *Jet Boat*, as well as a spate of recent games based on BMX and Motocross.

With the boom in the home computer games market coinciding with public interest in the Olympics last summer, there were more track and field events being played indoors than out. *Track and Field* led the way in the arcades, and Commodore's *International Football* broke new ground in the home computer market. Animation techniques were developed considerably in games like *Daley Thompson's Decathlon* and *Summer Games*. Tennis simulations reached a high point with Psion's *Match Point*, ice hockey gets the micro treatment in Anirog's *Slap Shot* (recommended), you can enjoy the slap of leather against willow in your own home (*Cricket*, CRL) and basket ball can be played on your CBM 64 with *One on One* (Ariolasoft). Golf games pop up regularly, and there are strategic simulations of sports management — *Football Manager*, and *American Football* for example. It's impossible not to give Phipps Associates a mention for *The Forest*, a simulation of orienteering providing hours of fascination.

Although programmers usually go straight to the arcades for ideas, they've also delved deep in many other fields in the search for new scenarios and frameworks on which to build. The plundering is now in full swing — everyone likes a good story and some of the oldest remain the best.

Some unlikely classic tales have been used, Dante's *Inferno*, *Tristan and Isolde*, *The Fall Of Rome*, while even the Bible has given us adventures — *Galilee* and *Jericho Road*. And such ideas aren't limited to adventure frameworks, we now have arcade games with titles like *Pegasis*, *Gandalf*, *Orpheus in the Underworld* and *Gift From The Gods*. However, this borrowing of ideas often means little more than a scenario, and character's names, and is all too often limited to the purple-prose description of the game on the package cover, often more exciting than the game itself.

"The game of the film"

While you can now play the game of the book, you've been able to play the game of the film for longer. *Donkey Kong* may only have a tenuous connection with the film, but shows clearly how game designers' minds work and how a star is born. Film/book based games have included *Hunchback*, *Tarzan*, *Frank 'n Stein*, *Castle Dracula*, *Bruce Lee* and *Indiana Jones*. The trench scenes from Star Wars are etched on countless TV tubes and innumerable variations have been produced. Palace Software received mixed reviews of its *Evil Dead*.

Alien could have made a great game, but Mindgames hasn't seen much in the way of success with its version.

Illustration courtesy of Micro Power

Ghostbusters was a smash hit film and, if one can believe the games charts, is enjoying an extended life in many British homes. Now Domark plans to launch 007, based on the films of the books. CRL has been announcing the game of the film of the musical, *The Rocky Horror Show* for some months, but we've come to be wary of such lengthy promotional campaigns in the wake of *The Great Space Race*.

It's interesting that apart from an old Atari VCS version, no-one's snapped up the rights to Superman; with all those superpowers you could design a very nice complex game, combining strategy and shoot-em-up.

Two similar media are TV programs and cartoons. We've seen *The Fall Guy*, *Airwolf*, *The Dukes of Hazzard* and even *The Magic Roundabout*. Roland the Rat is around somewhere, you can play *Dallas Quest*, *Blockbusters* and even *3-2-1* on your micro. Given the cartoon quality of

"Static cartoons are good material"

sprite graphics, it's surprising that that medium hasn't been more widely exploited, presumably the licensing from giants with a keen eye for bucks is too expensive. Static cartoons are good material — Beyond's *Spy vs Spy* should do very well and the success of Mirrorsoft's

use of Roger Hargreaves' Mr. Men is patent. There's *Spiderman* from Adventure International and DK 'tronics has been billing *Popeye* as 'real soon now' for ages — there's a goldmine here for those who care to look.

Cartoons often revolve around a single character and software houses haven't missed that trick — look at Microdeal's Cuthbert series, Melbourne House's Horace, Mikro-Gen's Wally and now Amsoft's Roland.

"Games of a political nature"

Some unexpected sources are chosen — how about politics? There's been *Monty Mole*, banned from Boots because of its (marginal) political nature, *Seaside Special* lets you throw radioactive seaweed at recognisable Cabinet ministers peering out of the windows at number 10. Even dance has been computerised by *Breakdance* from Epyx.

The peak of board game conversions is, of course, chess, and while computer versions of the game probably started with printed output only, you can now buy *Mychess II* and Psion's *QL Chess*, replete with three-dimensional view of the board. There are many, many chess programs about now, some are simple but some provide a challenge to even very good players. There are also dedicated chess-playing machines. Chess provided the backdrop for a flash of genius — *Archon*. In this you play the strategy aspect with pieces of different movement ranges, but the game comes into its own when you want to capture a square — a battle ensues between the contesting pieces, requiring more manual dexterity than cerebral judgement. There are computer versions of Risk, Monopoly, Cluedo, Scrabble and Kensington. Go is very popular in Japan, on board or computer, and several versions for the UK market are now available.

Illustration courtesy of dk 'tronics

In the UK micro/board game field, two companies stand out: Leisure Genius and Games Workshop. The latter sprang up from interest in Dungeons and Dragons and Games Workshop's *Battlecars* faithfully recreates the company's board game, adding an extra dimension; real player interaction as in an arcade game. There are also computer-mediated board games such as *Atram*, *Conquerors of Space* and *Empires*.

But it's not just board games that have been taken up — there are computer versions of most card games, Bridge is quite popular (and there are a number of programs designed to help you learn the game), and there are even versions of Strip Poker.

Humour is difficult to incorporate in computer games. The most obvious

source is text adventures, and those from Automata, Richard Shepherd (*Urban Upstart*) and Nemesis (the Arnold Blackwood series) are worth noting. No mention of humour and computer games would be complete without a deferential bow to the genius behind Microsphere's *Skooldaze*, readers should beg the company to produce it for the CBM 64. Readers with a penchant for the Spitting Image sense of humour may try their hand at *Di's Baby* from the aptly named company, Bad Taste Software.

"Pocket money games"

No overview of the UK games market would be complete without passing mention of pocket money games. Mastertronic led the way, keeping its games prices below £2 and showing that there are players prepared to sacrifice quality to cost. After all, many gamesters simply cannot afford to pay between £6 and £10 for the latest number one. British Telecom's software arm, Firebird, has its silver range selling at £2.50 and Creative Sparks, the home software division of Thorn-EMI, has launched its Sparklers range at the same price. Software Projects has its Software Supersavers at £2.99 and Beau Jolly, Computer Records, Alligata, Automata and English Software now offer collections of past hits at low prices.

"Too much scope for hype"

This last point highlights the close parallels between the games software industry and the world of pop records. True, we don't have the cult of the programmer, though some names (Geoff Minter, Scott Adams, Tony Crowther, Matthew Smith) are quite well-known. Followings tend to be more software house orientated, with a few names having a reputation for high quality games — Epyx, Ultimate, Beyond, Level 9 and so on.

A good musical theme can improve a game, but there have been problems — Mastertronic had to fork out a handsome sum for using a Michael Jackson hit in its game Chiller. On the other hand, pop songs may turn out to be a useful source of new ideas, someone somewhere is working on *Yellow Submarine*, and it's not hard to list half-a-dozen titles with games potential off the top of your head. The problem here may be one of greed — licensing fees may be prohibitively expensive.

"Videodisc technology and micro interfaces"

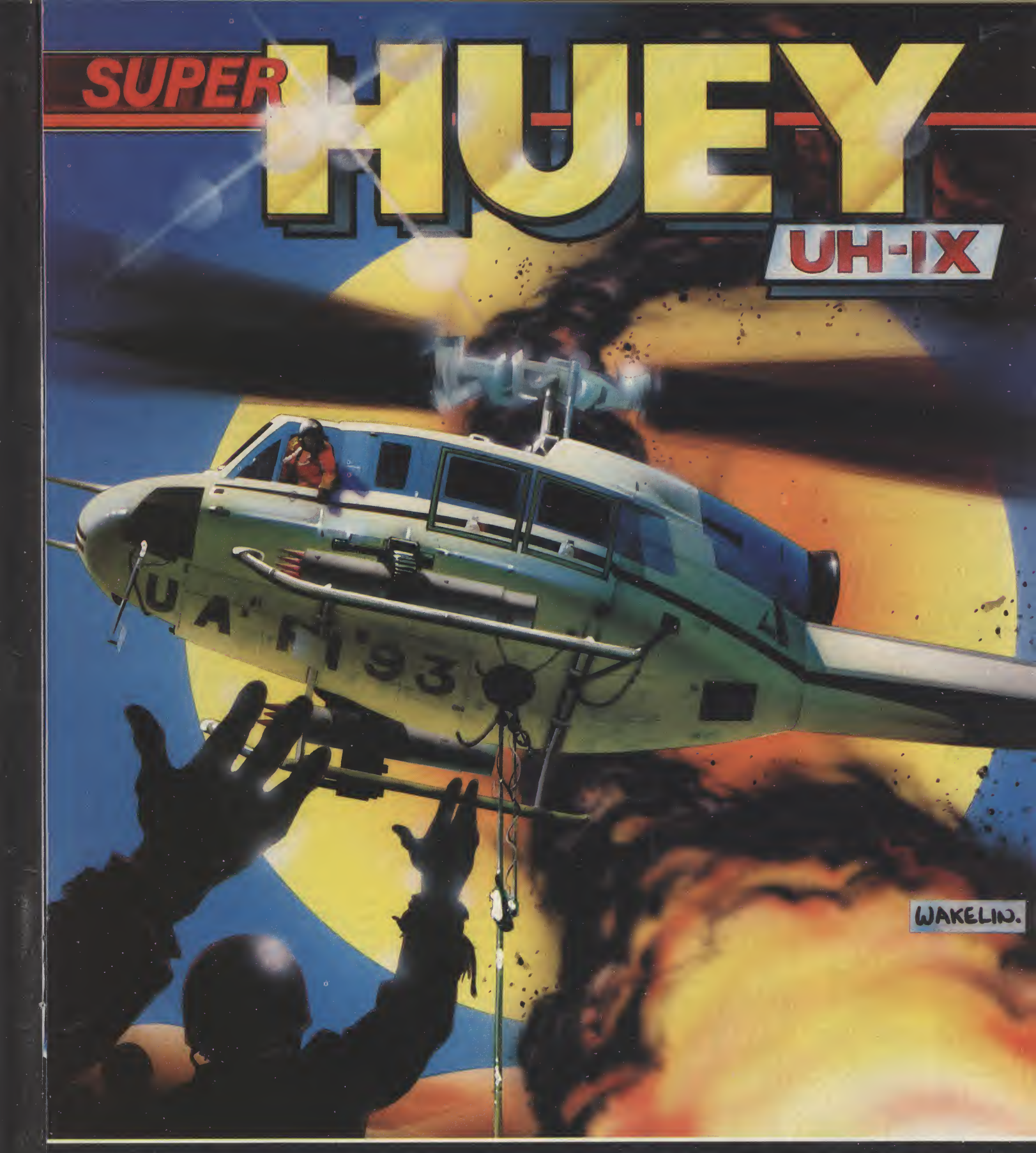
The most exciting recent development in home computer games began with *The Hobbit*, the first illustrated adventure. Then came *Valhalla*, an animated adventure and now there's *Castle Quest*, the first true blend of arcade action and adventure problem solving. Arcade machines using video disk technology and micro interfaces may open the door to yet more cross-fertilisation of ideas.

And then there's that unlimited pool of resource — imagination. It's becoming increasingly important that a game doesn't just present a pretty picture, good music and fast action. Games players reared on today's software expect more and more sophistication in all these areas and demand that elusive quality — playability. With the advent of 16 and 32 bit processing power, better video control and sound chips, and falling prices, home micros of the future will be awesome beasts, but will they stimulate games programmers to produce better games? That hasn't happened with the QL, but perhaps QL owners aren't games players. Besides, it may take some time for programmers to adapt to a new chip and hardware, and software houses are reluctant to support a machine until they're sure of a large user base.

"Is the market saturated?"

The main question is whether the home computer market will continue to expand as it has done so over the last two or three years — yes the boom is that recent. Some say the market is saturated — those interested already own a micro, and there are thousands languishing in dusty cupboards throughout the land. If MSX attracts the hi-fi/camera/video buyers we might look forward to renewed interest in games, and the new machines from Commodore and Atari (not to mention Amstrad and others) may stimulate the public. If not, 1985/6 will see a decline in new games, and as with so many technological industries before, we'll be left with a handful of software houses and fewer micro manufacturers. Only time will tell, but for now it's back to *Archon*, *Castle Quest*, *Elite*, *Raid On Bungeling Bay* . . .

Bryan Skinner



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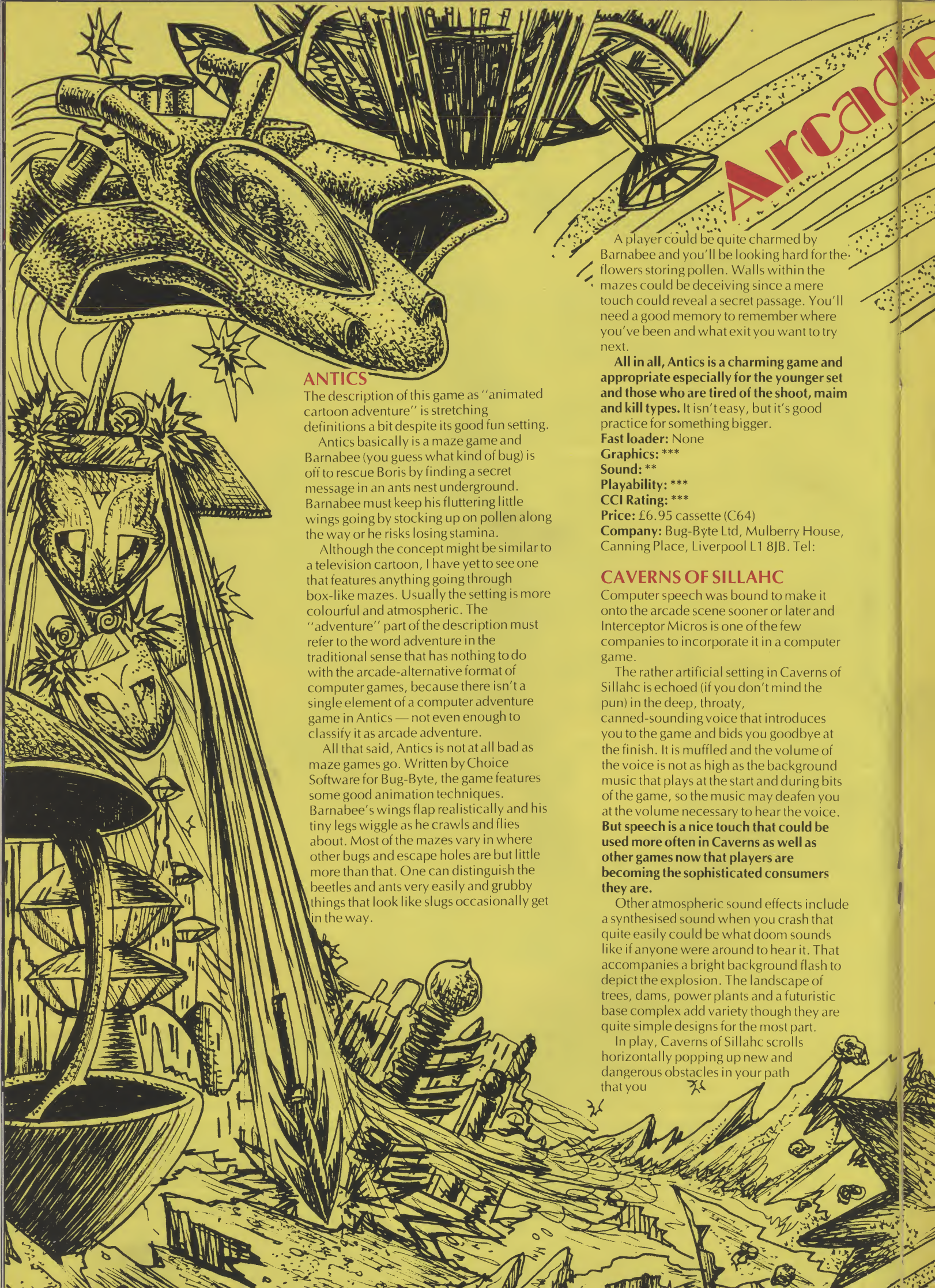
ATARI



Arcade

ANTICS

The description of this game as "animated cartoon adventure" is stretching definitions a bit despite its good fun setting.

Antics basically is a maze game and Barnabee (you guess what kind of bug) is off to rescue Boris by finding a secret message in an ants nest underground. Barnabee must keep his fluttering little wings going by stocking up on pollen along the way or he risks losing stamina.

Although the concept might be similar to a television cartoon, I have yet to see one that features anything going through box-like mazes. Usually the setting is more colourful and atmospheric. The "adventure" part of the description must refer to the word adventure in the traditional sense that has nothing to do with the arcade-alternative format of computer games, because there isn't a single element of a computer adventure game in Antics — not even enough to classify it as arcade adventure.

All that said, Antics is not at all bad as maze games go. Written by Choice Software for Bug-Byte, the game features some good animation techniques. Barnabee's wings flap realistically and his tiny legs wiggle as he crawls and flies about. Most of the mazes vary in where other bugs and escape holes are but little more than that. One can distinguish the beetles and ants very easily and grubby things that look like slugs occasionally get in the way.

A player could be quite charmed by Barnabee and you'll be looking hard for the flowers storing pollen. Walls within the mazes could be deceiving since a mere touch could reveal a secret passage. You'll need a good memory to remember where you've been and what exit you want to try next.

All in all, Antics is a charming game and appropriate especially for the younger set and those who are tired of the shoot, maim and kill types. It isn't easy, but it's good practice for something bigger.

Fast loader: None
Graphics: ***
Sound: **
Playability: ***
CCI Rating: ***
Price: £6.95 cassette (C64)
Company: Bug-Byte Ltd, Mulberry House, Canning Place, Liverpool L1 8JB. Tel:

CAVERNS OF SILLAHC

Computer speech was bound to make it onto the arcade scene sooner or later and Interceptor Micros is one of the few companies to incorporate it in a computer game.

The rather artificial setting in Caverns of Sillahc is echoed (if you don't mind the pun) in the deep, throaty, canned-sounding voice that introduces you to the game and bids you goodbye at the finish. It is muffled and the volume of the voice is not as high as the background music that plays at the start and during bits of the game, so the music may deafen you at the volume necessary to hear the voice. **But speech is a nice touch that could be used more often in Caverns as well as other games now that players are becoming the sophisticated consumers they are.**

Other atmospheric sound effects include a synthesised sound when you crash that quite easily could be what doom sounds like if anyone were around to hear it. That accompanies a bright background flash to depict the explosion. The landscape of trees, dams, power plants and a futuristic base complex add variety though they are quite simple designs for the most part.

In play, Caverns of Sillahc scrolls horizontally popping up new and dangerous obstacles in your path that you

...de Reviews

either destroy or try to avoid. Nothing new there. The fact that you ship is actually a converted agricultural robot sprayer doesn't give one the greatest confidence but it is possible to survive for a while at least.

The prophecy of a destroyed planet suggest otherwise, but that never stopped an aggresive arcade buff. And it's just that sort that will enjoy this trip to sci-fi land.

Fast loader: Micro Load
Graphics: ***
Sound: *****
Playability: ****
CCI Rating: ****
Price: £7 cassette (C64)
Company: Interceptor Micros, Lindon House, The Green, Tadley, Hants. Tel: 07356 71145.

PASTFINDER

With a fascinating name like Pastfinder, this newest game from Activision attracts attention immediately.

Set in the year 8878 AD, you are No Name (at least the game doesn't give you an identity) and you command a LEEPer vessel through the past searching for artifacts that you then must deliver to bases or stations along your route. A range of supplies is at your disposal such as heavy metal to protect LEEPer from radiation, but the catch is you only get one dose of each and that runs out quickly. Meanwhile you must watch out of obstacles such as walls that seem to be there just for the sake of being there though they will do substantial damage if you get in their way.

Your mission is to collect artifacts; unfortunately, the instructions don't tell you how to do this. Should you touch them or shoot them (the program hints at the latter) and which of the myriad of flying things are they anyway? The demonstration that runs automatically between games is not terribly helpful in warning you since the craft crashes before it gets to the crucial parts. But with some persistance, you figure out which of the objects comes closest to the "plate-shaped" description in the instructions, which by the way come in six different languages.

Graphics in Pastfinder are very good though they give you no sense of what the concept of pastfinding is. Smooth vertical scrolling and shadows that indicate your height off the ground give as much of a 3D impression as possible in this almost Space Invaders type of shoot-em-up game — a refreshing sight after looking at so many complex animated arcade screens that seem to be the rage these days.

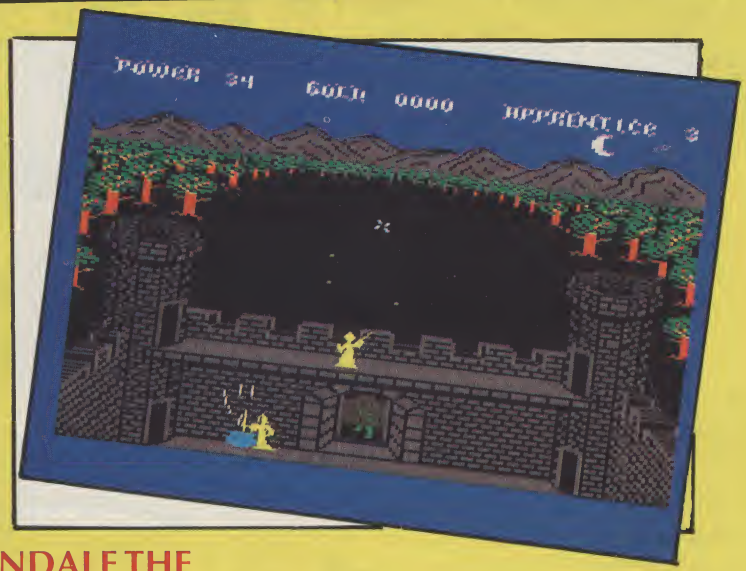
The walking and whirling actions of the LEEPer also are excellent and give a great effect of movement in the Star Wars sense.

At the beginning of each round of battle-frought flight, you select the direction you want to fly from a map which unfolds gradually in bits and pieces to show where radiation levels are highest, though there is no specified reason for radiation being anywhere in the first place.

All in all, Pastfinder is a good traditional style arcade skirmish with some great graphical effects. But much of the story – and instructions for that matter — are left to your imagination.

Fast loader: None
Graphics: ****
Sound: ***
Playability: ***
CCI Rating: ***
Price: £9.99 cassette (C64)
Company: Activision UK Ltd, 15 Harley House, Marylebone Road, Regent Park, London NW1 5HE. Tel: 01-486 7588

Illustration by Alison Watson



GANDALF THE SORCERER

Wizards, lizards, spooky castles and lightning strikes often are the subject of adventure games but not this time.

Birmingham company Tymac calls this one of its "enhancement products" and the graphics certainly do that for the 64. The game has only two screens but quantity doesn't restrict quality and the animation and stationery graphics are marvellous in detail and colour — better than the hundreds of only slightly varied screens seen in many arcade games.

The player is Gandalf, a wizard determined to protect his castle, its treasure and its inhabitants from the evil lizardmen who slimily sneak out of the forest to do their nasty deeds. When the lizards get near enough, they begin hammering at your gate to get in and if they succeed they could snatch one of your apprentices. You ward off the scaly things with your power bolts.

If all this fails, you'll have to chase the lizards either through your castle or through the forest to rescue your apprentice before they reach the Lizard Lair. The action is very fast throughout the game as Gandalf wields his power, sometimes helplessly as the power bolt doesn't always seem to work. Animation is quick and smooth and reactions to commands are good. The setting is bright and busy with forest, castle, hills, moon, boiling pot of magical brew, a flashing sparkler to depict power and a great puff of yellow smoke when a lizardman is destroyed. The occasional lightning bolt adds to the effect, which will remind you of some of the best animated films.

Mood-setting music is a great way to start, but it becomes repetitious and distracting after a while. The game isn't easy and you'll find yourself struggling to keep up with everything going on e.g. lizards pounding on the gate, Gandalf's power failing or the apprentices' movements. You'll also have to beware of the deadly spider and the yellow ostrich. (What is an ostrich doing in a medieval forest?)

Gandalf The Sorcerer is a good example of the quality of sound and graphics that can go into a game without diminishing the challenge and variety of playing it. It will be interesting to see what Tymac comes up with next.

Fast loader: Novaload
Graphics: *****
Sound: ****
Playability: *****
CCI Rating: *****
Price: £9.95 cassette, £14.95 disk (C64), soon to be out on C16
Company: Tymac UK Ltd, Unit 78, Gravelly Industrial Park, Tyburn Road, Birmingham B24 8TL. Tel: 021-327 6637.

BUCK ROGERS

Another famous-name related game. In this instance, it's TV space hero Buck Rogers . . . how closely the game relates to the series is another question.
In itself, the game is an excellent example of a zap 'em space extravaganza. As Buck, you must skim a planet's surface shooting down various flying and bouncing enemies.

Life is made more difficult due to the fact that you must fly through pairs of 'pylons'. No only does this gain you points, but flying outside puts you in danger of being zapped by intermittent electrical surges.

Your craft swoops, climbs and banks realistically. Horizontally scrolling lines indicate movement well. Sound is also particularly effective — particularly the bouncing aliens.

If you successfully cross the planet's surface, you zoom off into space to battle against the Mothership.

Buck Rogers is an addictive and reflex-testing example of an arcade game.

Fast loader: Yes
Graphics: ****
Sound: ****
Playability: *****
CCI rating: ****
Price: £9.95 (cassette) £12.95 (disk)
Company: US Gold, Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham. Tel: 021-359 3020.

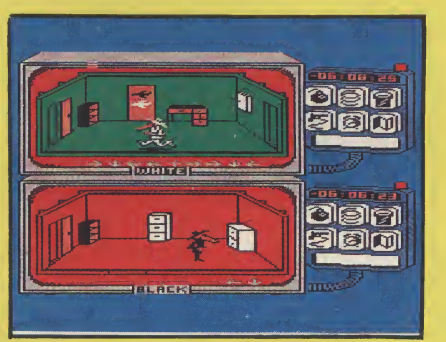
SPY VS SPY

The crazy antics of the odd, sniggering adverseries in MAD Magazine's comic strip have come to the home computer screen and the characters are better than ever.

Produced by the American software house First Star, Spy vs Spy is based on the cartoon characters created by Antonio Prohias for MAD in 1960. The transition from paper to screen is entirely natural with the quality of First Star's production. **Graphics, sound, music and plot are well-contrived and loaded with all the humour of the original dastardly plotting for which the rival secret agents, dressed in the symbolic black and white, are famous.**

Graphics are complex including high resolution screens, classic animation and well drawn characters complete with hats, long pointed noses and wicked grins. And at the end, the winner flies off the edge of the screen in his classic aeroplane.

Spy vs Spy allows either one player vs the computer or two players up against each other in simultaneous play. The actions of the joystick-controlled spies are tracked on their respective screens as they move about the rooms searching for money, passport, key secret plans and a briefcase to put it all in.



Each has the same amount of time to achieve this and leave the building. All the while, you can command your spy to set a trap using weapons like a gun and string or bomb. The fun is in the knowledge that your opponent will be doing his own plotting.

This game will take some effort. Just finding all the items is a feat in itself. You'll also have to keep track of the other spy's movements, perhaps fight him occasionally. Then there are the booby-traps to consider and so on. Of course, if you get tired you can always sit back and watch the entirely entertaining demonstration.

The ultimate is to be ranked a What A Guy Spy and this game definitely makes trying fun.

Fast loader: Yes
Graphics: *****
Sound: *****
Playability: ****
CCI Rating: *****
Price: £9.95 cassette (C64)
Company: Beyond, Competition House, Farndon Road, Market Harborough, Leics LE16 9NR. Tel: 0858 34567

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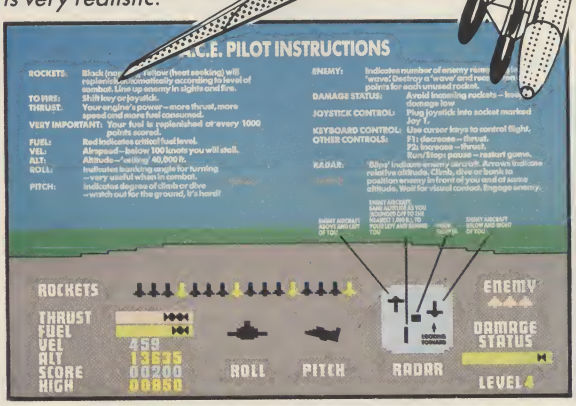

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GUMSHOE

You are Gumshoe, a wily private detective on the trail of the kidnappers who nabbed a millionaire's daughter. The game starts at the tower blocks where they've stashed her and Gumshoe's job is to climb, scrape and waddle his way to find her.

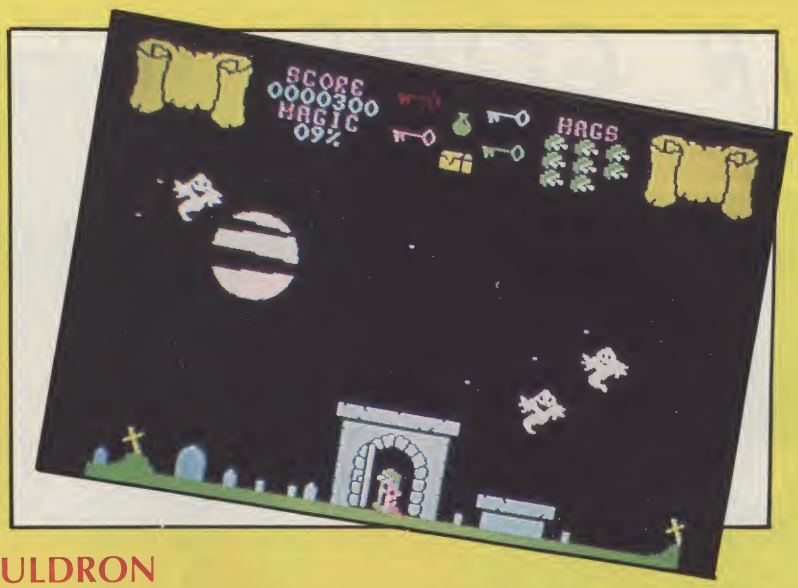
The 150 screens feature the basic lifts, escalators, trapdoors, etc, along with the slightly-off-the-beaten-path laundry chutes as methods of travel. Though there isn't much variety once you've seen a few screens, Gumshoe is still an addictive creature and if things get a bit too easy, you can always get him into a fight with the baddies just for the fun of watching. And Gumshoe's walk, whether he's walking or climbing, is smooth and well-done.

The claim of a 50/50 chance of winning a fight might not sound quite right at times, but watching your little character struggling is fun nevertheless.

If you get stuck, you can send off to the Gumshoe club for a booklet with the 10 maps of the tower blocks. This would help keep you in credit since the game constantly monitors your current account balance with debits registered for medical costs after a fight and for ammunition. Of course, you get points (oops, credits) for each baddy you shoot down and a large bonus if you find the girl.

The sounds of shooting are quite good but the game has a constant background humming noise that seems to have no purpose.

Fast loader: None
Graphics: ***
Sound: **
Playability: ****
CCI Rating: ***
Price: £7.90 cassette (C64)
Company: A&F Software Ltd, Unit 8, Canal Side Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB. Tel: 0706 341111.



CAULDRON

From the vague, rhymed instructions to the flapping bats' wings and steaming volcanoes, Cauldron keeps you in suspense with the only rules being trial and error.

Ghosts and goblins, pumpkins and cloud-covered moons — all to greet you along your spooky way to find the crucial keys to the doors you pass this Halloween night.

Cauldron is one of the new generation arcade-adventures and a brilliant example at that. Palace Software, creators of the Valkyrie 17 computer adventure, make you work for your reward in Cauldron, though you won't even know what the reward is until you've failed.

A rhyme of 32 brief lines gives you the only clues and sounds suspiciously Macbeth-inspired.

Graphics are top-notch, among the new breed of detailed, colourful animation that makes you wonder why it wasn't done before. The witch-queen at your command flies about on her broom, hair blowing and long chin laughing with an evil quiver. Below her the landscape changes from a cozy cottage with its little red door sitting among densely-wooded forest to the barren clay-like surface of a volcano site still smoldering in the aftermath of an eruption.

And then there's . . . the underworld. Protecting your hags from danger isn't easy but at least there are nine of them. And don't let the terrific mood music distract you from keeping tabs on your magic level.

All these bits make a bubbling brew of fun and excitement, but don't lull yourself into thinking this is a clue. You're on your own.

Fast loader: Yes
Graphics: *****
Sound: *****
Playability: *****
CCI Rating: *****
Price: £7.99 cassette (C64)
Company: Palace Software, The Video Palace Ltd, 275 Pentonville Road, London N1 9NL. Tel 01-278 0751

SEASIDE SPECIAL

Crabs, seaweed, screaming gulls . . . and Margaret Thatcher — we'll not speculate on the connection except that they're all in the game Taskset finally found the time to release.

The wait was worth it. Seaside Special's art work, sound effects and plot line are original, lively and more entertaining than all those animation clones that so frequently make it to the shelves. With an original idea from AJ Gibson and graphics by Mark Harrison, this trot through beach bum life is fun and so creative you wonder how they ever came up with the idea.

The storyline, actually, is rather warped though one suspects a tinge of political statement tucked in the corners. The evil "Politikians" have turned lovely, peaceful Rothsay Beach into Rot away Beach by building a plant there to process nuclear wastes.

Our hero in this case is a lackadaisical, sailor-capped beachcomber called Radium Rodney, who springs into action

after he decides the only way to stop the Politikians is to bombard them with their own radioactive seaweed. (Why wouldn't I have thought of that?)

Slimy green quicksand, sneaky crabs and vicious jellyfish meanwhile seek their quota of human flesh, so you must watch out. And the armed guards patrolling the beach fire a shot whenever you get in their line of sight. Once you get to Number 10 Downing Street with your helping of seaweed, look out for the gross things like banana peels so distastefully flung out of windows by the Politikians "deceptively appearing as the cabinet themselves."

Brilliant and superb are words that spring to mind in this detailed, crafilly designed game. From touches like the tide coming in to the characters appearing at the Downing Street windows, Seaside Special has an array of cunning surprises and special ingredients. Smooth scrolling animation and intricate settings compete with screeching gulls and the low roar of the tide for attention.

Seaside Special is a must for anyone who wants to see some of the best of what the 64 can do with a great effort such as the work that went into this game. It's as much fun to play as it is to look at.

Fast loader: Pavloda
Graphics: *****
Sound: ****
Playability: *****
CCI Rating: *****
Price: £6.90 cassette
Company: Taskset Ltd, 13 High Street, Bridlington, Yorks YO16 4PR. Tel: 0262 602668.

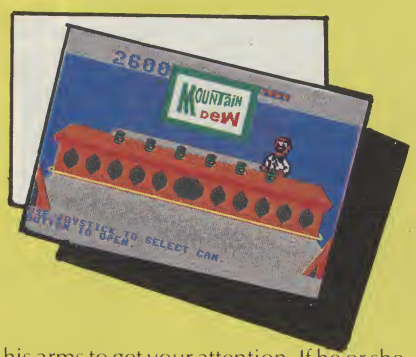
TAPPER

"Side-splitting, soda-slinging laughs and spills" is in no way an exaggeration. This tapper's (bartender's) life is full of them, depending of course on how well you play the game.

If you don't spend your time bowled over with frantically hysterical laughter you may be able to function fast enough to manage this crazy arcade spree. You control the harrowed bartender trying to service his ever-increasing numbers of customers, keep empty mugs from crashing to the floor and save yourself from being tossed onto the bar and slung against the wall. But don't get too anxious. If you pour one too many drinks it will only go crashing into the wall at the other end of the bar.

Tapper is extremely addictive, but it isn't due to the drink since the only thing the bar serves is Mountain Dew, a fizzy, lime-yellow American soft drink similar in taste to the Brits' Lilt. This is just one of the many Americanisms in Tapper, a game imported to the UK from American software house Bally Midway. Others include gestures by the bartender reminiscent of comedian Steve Martin and the folk tune "Oh Suzanna" during the Old West Saloon scenes.

You certainly don't need to speak American to have a go, however. You will need a good joystick, though, with clearly defined up, down, left and right movements and a well-placed fire button. In each scene you have four bars each with at least one customer raving and flagging



his arms to get your attention. If he or she gets to the end of the bar without being served, the character promptly picks you up and flings you to the end of the bar.

Depending on how far along you get, your skills are tested and tried by cowboys, jocks, punks and space creatures in four different bars. Consider them non-alcoholic pubs if you like, but that doesn't mean you won't encounter some aggressive swillers.

This is one of the most sparkling, high-spirited and original games on the market and it will keep you glued to your computer for hours (when you aren't laughing hysterically, that is). The animation is superb — the best we've seen. Considering Tapper was first released in the US in 1983, it says a lot for how much further along the American games market is. The sound effects like smashing glass and appropriate background music simply top an already excellent program.

Tapper is for those times when serious is the last thing you want to be with your computer.

Fast loader: Novaload
Graphics: *****
Sound: ****
Playability: *****
CCI Rating: *****
Price: £9.95 cassette, £12.95 disk (C64)
Company: US Gold Ltd, Unit 10, Parkway Industrial Estate, Heneage Street, Birmingham B7 4LY. Tel: 021-359 3020

ACE (C16)

Air Combat Emulator is what ACE stands for and that's what this program is. As a combat emulator rather than a flight simulator, you avoid the frustration of attempting to take-off and land safely. You are already airbourne and your task is to seek out the enemy and blast them from the sky.

ACE stands up admirably in comparison to it's 64 equivalents. A cockpit display shows your status and a radar indicates the position of enemy fighters.

Daytime, dusk and night flying are all catered for.

Your opponents are cunning devils. When sighted on the radar you must match their position and height. Once you have them in your sights, be positive in your attack. If you miss, they will turn the tables on you and they don't often miss.

Control is via keyboard or joystick, but I always think the joystick gives a more realistic feeling of being in control of the plane. Graphics in the scenery are basic as in most games of this genre, but the plane banks smoothly and the cockpit display is effective.

The hack-hack of guns and hum of engines is also realistically entertaining. **If you are a C16 owner with Red Baron tendencies, ACE is worth looking at.**

Fast loader: No
Graphics: ***
Sound: ***
Playability: ***
CCI rating: ***
Price: £9.95
Company: Cascade Games, 1–3 Haywra Crescent, Harrogate, N Yorkshire. Tel: 0423 504526

MOONRAKER

The futuristic geometrical effect of Moonraker's lunar landscape graphics is the highlight of this contest that takes you to the planetoid Geevor as its protector.

The player commands a sub-orbital craft with the main risk being that you must fly as low as possible to destroy scavenger craft and avoid the deadly Fireball. Seeking out the scavengers who threaten your planet is a healthy challenge that requires accuracy and good timing so that you can home-in on the target shown on your infra-red screen.

This latter feature is an effective touch but it shares the limelight with the main draw, the 3D radar graphics landscape display. J&J Gilmour designed the unique relief feature with a compact database incorporated into the game. But because the relief display shares the monitor screen with other cockpit-type elements, it is quite small and loses some of the impact. What is there, however, is very dramatic and one of the game's features is hyperspace jump, just to liven things up.

The biggest gripe is the totally inadequate attention to sound effects in a game that simply begs for them. High speed chase mode, target sighting and many other functions are void of sound effects that could add so much to the action. It is as if Moonraker's creators spent so much effort putting the graphics in shape that they forgot sound altogether except for a meager explosion effect when the Fireball destroys your craft. Even when the sub-orbital crashes to the ground, the player gets no sound or graphic effects.

Overall, Moonraker is a good technically-designed game for the money, but lacks the drama and little bits that draw a player into the screen.

Fast loader: None (7 mins)
Graphics: ****
Sound: *
Playability: ***
CCI Rating: ***
Price: £6.95 cassette
Company: J&J Gilmour Ltd, 4 Copse Close, Liss, Hampshire GU33 7EW. Tel: 0730 893430.

DEFENCE 16 (C16)

New company, Probe Software, launch with this Defender-style game. Surprisingly there seems to be no joystick option with this game so a little nifty finger work on the keyboard is required.

You control a spacecraft (which bears a remarkable resemblence to a seagull!) and your task is to zap down invading invader-type aliens which come at you from all angles. The first thing you learn to do is press thrust as soon as the game begins or you're dead before you start.

Graphics are pretty basic, but still effective — in particular the stylish effect of an explosion is you are shot down. Apart from the usual commands, you have the option of hyperspace and smart bomb.

An average zap 'em space game, but we would like to see a joystick option.

Fast loader: No
Graphics: ***
Sound: ***
Playability: ***
CCI rating: ***
Price: £7.99
Company: Probe Software, 74 Ribblesdale Road, London SW16 6SE. Tel: 01-769 2133

...7 busy characters, 10 lost chords, 12 hours, 48 Traffic Wardens, 95 London Tube Stations, 126,720 square feet of London, 7 million Londoners... 943 action filled screens.

PAUL McCARTNEY'S *Give my regards to*

BROAD STREET

When the music stops, the mystery begins...

MIND GAMES

COMMODORE 64 – £7.99

Argus Press Software Group

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20th CENTURY FOX

LODE RUNNER

This fast-action arcade game could be just another maze game. But it isn't.

Broderbund Software, the American company that has taken so many games to the number one position in the US, made the action addictive and frenzied as your Lode Runner tries to collect chests of gold. But he has enemies and they try to stop him at all costs.

While the graphics are basic with a few enhancements, graphics aren't always the important element and this is one of those cases. Here it's the action that keeps you looking closely. You soon become convinced that those enemies of the Bungling Empire (the subject of several Broderbund games) are actively plotting against you, never mind that it's just a computer.

Boasting 150 different puzzles and scenes, you'll be hard pressed to get beyond many without a lot of effort but the excitement is worth it. All the better if you like puzzles for Lode Runner's maze-like arrangements of passages, ladders and poles for climbing provide all the thinking matter you could want.

You have to collect all the gold chests on one screen to advance to the next, but there is a cheat mode if you're feeling impatient that lets you go on to the next level. Be prepared to face the consequences, however.

A terrific extra for this average-priced package is the game generator that lets you design and save to disk your own Lode Runner games by creating any sort of game board you like. You can also access any of the 150 screens in the prepared game directly through the game generator.

Lode Runner is an excellent game in its own right that will keep the most expensive of strategists entertained for a long while. Even then the game generator picks up where Lode Runner leaves off. Any games enthusiast will get months if not years of quality, long-lasting fun out of it.

Fast loader: Yes
Graphics: ***
Sound: **
Playability: *****
CCI Rating: ****
Price: £9.95 cassette, £12.95 disk (C64)
Company: Ariolasoft Ltd, Ashphelte House, Palace Street, London SW1. Tel: 01-834 8507

All games reviews appearing in this magazine are personal opinions and serve only as a guide to new games on the market. Our star ratings for graphics, sound, playability and the CCI rating are as follows:

*** = Poor**
**** = Average**
***** = Good**
****** = Very good**
******* = Excellent**

3D LUNATTACK

The sight out the window of your Z5 Hover Fighter is one to behold.

A scene of craters and hills on the lunar surface below is as convincing as anything in a popular sci-fi film, particularly at first glance. At closer examination the horizon might look more like a coral reef and you may have difficulty distinguishing the little enemy ships from the surroundings, but the effect of the high resolution, smooth scrolling graphics is just as powerful. It gives you that funny little feeling that space flight the likes of Star Wars is in your reach.

When that happens, however, I should hope the machine you are flying reacts a bit faster than the mechanics of 3D Lunattack. The joystick operation is distrubingly slow for what should be a fast-action arcade spree. Changing into "map mode" to track your own movements and those of the Seiddab lunar forces. You'll also have to keep track of your hull temperature and fuel levels while planning your weapons strategy with a choice of aerial mines, floating laser spoors, missile silos, etc.

All in all, 3D Lunattack makes maximum use of colour, graphics, sound and mood setting to bring a genuine arcade flavour to the home computer. The game works on joystick or keyboard control.

Fast loader: None (2 mins)
Graphics: *****
Sound: ****
Playability: ****
CCI Rating: ****
Price: £7.95 cassette (C64)
Company: Hewson Consultants Ltd, 56B Milton Trading Estate, Milton, Abingdon, Oxon OX14 4RX. Tel: 0235 832939.

PACMANIA (C16)

Conversions of popular, or once popular, games still account for a substantial percentage of software for the C16. Here we have a version of Pacmania, very true to the original. I wonder, though, whether the demand is still there for these comparitively basic games.

As in the original, you direct your Pac-Man around a maze of gobbling up power pills and fruit while avoiding the 'ghosts' whose embrace is fatal.

You can leave the maze on one side and reappear on the other and there are also positions which enable you to reappear elsewhere if the going gets tough. And, of course, eat the flashing pills and you can gobble up the ghosts while they are harmless.

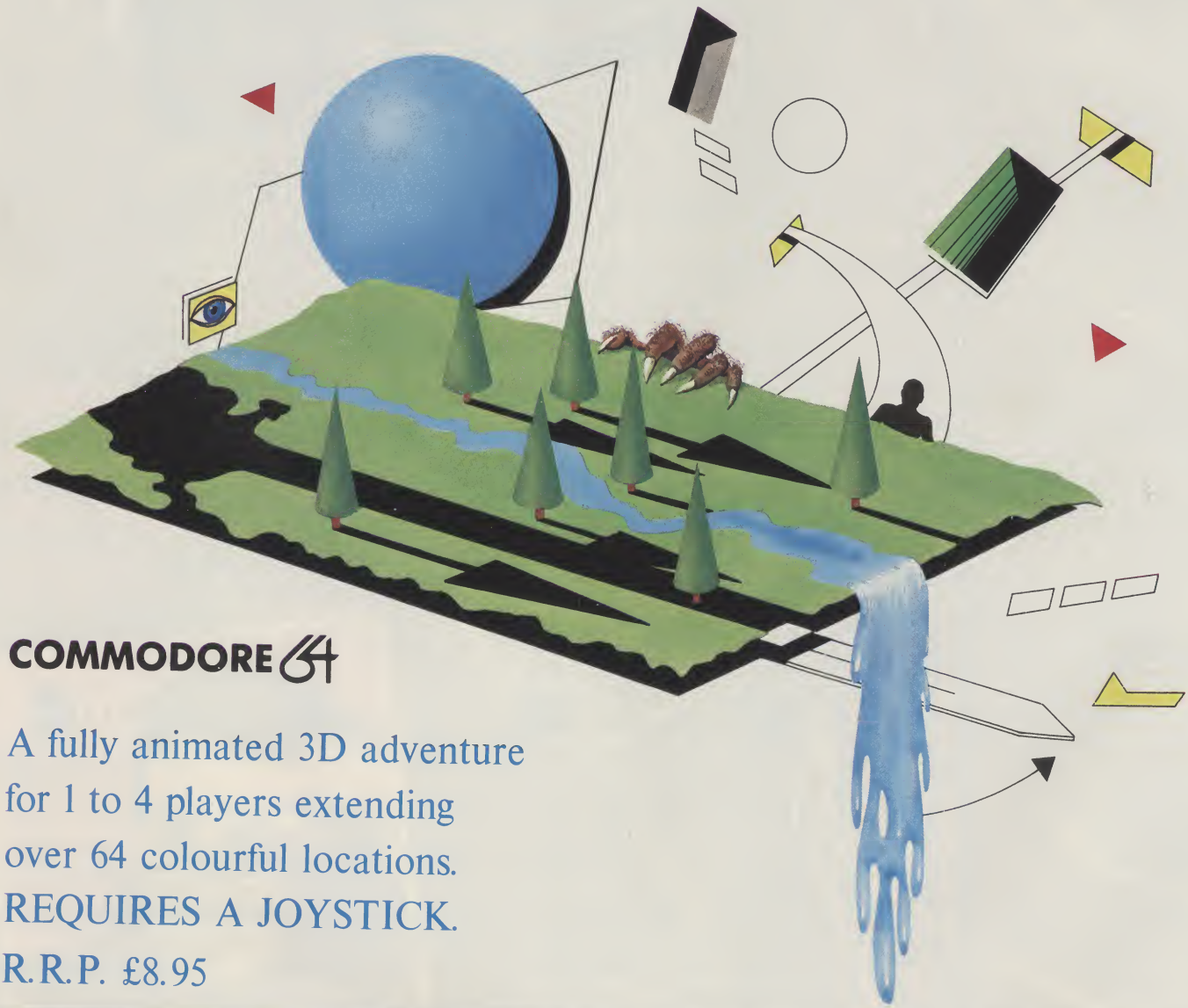
It may be imagination (or old age creeping on!), but the ghosts appear to move faster in this C16 version, rendering my old tried and trusted route useless. It's also worth making the ghosts harmless purely to listen to the catchy sounds they make in this transition!

An old, old theme, but still quite addictive.

Fast loader: No
Graphics: ***
Sound: ***
Playability: ***
CCI rating: ***
Price: £5.99
Company: Mr Chip Software, 1 Neville Place, Llandudno, LL30 3BL. Tel: 0492 79026

DURELL SOFTWARE

SHADES



COMMODORE 64

A fully animated 3D adventure
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What's your handle?

Unless you're a whizz on the computer keyboard, joysticks are the only feasible, easy-to-use method of playing arcade games. CCI tries its hand as some that have come onto the market in recent months.

"Ergonomics" is a word often heard in computer circles these days, particularly in hardware, and joysticks are no exception.

Kempston, for example, is one company talking about "ergonomic styling of base and tapered, nylon covered steel shaft" in describing its Joystick Pro 5000.

Ergonomics seems to do mostly with looks and comfort, and the look of joysticks is changing dramatically. The traditionally basic black, box-and stick are giving way to more colourful mechanics. Stop-light red, neon-blue, beige with gray, black with red or red, white and blue — all are colours or combinations used in the newest joysticks released over the past six months or so.

Of course considering the usual drab colours of Commodore computers, you may have a case of the servant outshining the master. But never mind that. Most of the new generation, splashy joysticks coming out are no more expensive than their plain parents, so you've little to lose. And if you're into "ergonomics" (Hayward and Sparkes' Concise English Dictionary doesn't even know what it is), these daring advances should be a relief from joystick drudgery.

All that said, however, don't judge a joystick by its cover. They look as different inside as out. The switches that send signals could be leaf switches of touch-sensitive pads, each of which affect its sensitivity. One gives smooth, constant movement while another may move in intervals with steps of a defined distance. The latter would require you to push repeatedly in one direction to keep moving, but it gives firm control.

The overall design has a lot to do with how easily the joystick is to use. If you like to hold it in your lap but the base isn't shaped just right, you could be in for a painful time. Some people like comfortable handles; others feel they get better handling by using just part of the hand so the shape of the stick isn't crucial.

Joysticks generally are inexpensive as peripherals go, but they wear out quickly with rapid-action, rapid-fire games, so be aware that one may last you only about a year depending on how and how often you use it.

In judging these latest offerings, we've considered sensitivity, speed of response, durability, ease of handling, sturdiness on the table top and price. Each was tried on more than one type of game so we could see how appropriate it was to each situation.

Clockwise from far left: Wico Three-Way Deluxe, Vulcan Gunshot I, Kempston Formula 1, Protek Powerplay, Ascom High Score, Vulcan Gunshot II, Cheetah RAT, Marconi RB2 Tracker Ball.

GRAND PRIX FORMULA 1

Kempston basically re-packaged and redesigned its Competition Pro 5000 model for this new racing circuit line of joysticks. It's the same shape as the original but with a bright blue exterior and huge, white fire buttons.

The significant change is the new micro switches inside. They give precise control in eight directions, and audible clicking noises help you to know when you've moved or haven't. If you want different lengths of constant movement Formula 1 won't do quite as well, although it still out-peforms most.

The two large, sensitive fire buttons are good for right or left-handed play and while the base is sturdy enough to use on a tabletop, it's also shaped comfortably for hand-held play. At a price of £16.95 it's a bit more expensive but we still recommend it highly.

VULCAN GUNSHOT I

The grey moulded handle of the Gunshot sits on a wide, firm base of grey and beige. That and the suction cups make it a good one to play on a table top but, again, awkward for holding in the hand.

The fire button on the base didn't have the sensitivity of the one on top of the handle and the fact that it is located on the left side front makes it difficult for left-handers. Movement is in eight directions, if you can figure out which direction you're moving that is. The stick is much too loose to give frim control and we found it difficult to distinguish the center neutral position. It also waggles quite a bit even when you're not touching the handle.

Gunshot I sells for £8.95, quite a good price nevertheless and the quality of construction is good.

VULCAN GUNSHOT II

Vulcan makes this version with an auto-fire switch, a wonderful asset for the most erratic, fast-action zap-em-ups. The handle control also seems more firm than Gunshot I. The only problem is that the switch cover falls off if the joystick is dropped or falls over. Gunshot II is available in the grey and beige colours or basic black at an RRP of £11.95.

All is not lost for C16 owners in this respect. Vulcan produces a very simple interface cable for £4.95 that allows any Vulcan or D-type joystick to be used with a C16.

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POWERPLAY

A firm, finger-moulded handle and rapid-fire button are good features for one of the first joysticks made specifically for the C16.

Manufactured in China, Powerplay has terrific eight-directional firing ability and a reasonable sensitivity. The fire button on top is really for single shot action but we found it to be the most useful one even for manual rapid firing. We found the button in the contoured handle not terribly useful but that depends on personal preference.

The main gripe, once again, is the base. It is wide, moulded and stands on four suction pads yet it's much too light for real table-top use. And if you're hands aren't the size of elephant's feet, holding the Powerplay could become painful.

At £11.95, this one seems overpriced, particularly considering its use is limited to C16.

COMMAND CONTROL

A peak at what makes joysticks tick.

This Three-Way Deluxe Joystick has a lot to answer for — £25 in fact.

Unfortunately, it doesn't quite get there. The steel shaft underneath the handle shows too much play to give a good idea of movement, but the reaction depends on the handle. We would recommend either the grip handle or the one shaped like a baseball bat. With the third handle, we found it better to hold it near the bottom instead of gripping the whole thing. A button selector switch lets you use either both fire buttons or just the one on top of the stick. That's wasted cosmetics, though. Why would you want to limit yourself?

It takes some confidence to price a joystick this high. Granted the three interchangeable handles and heavy, solid construction make the Deluxe one of the best-made products we've seen. We still have to question the pricing considering the normally brief life-span of joysticks and this one's average performance. A big plus is that its warranty is for two years instead of the usual one.

ASCOM

This attractive looking joystick of red, white and blue has a finger-grip handle that tilts forward in the neutral position, probably to give the effect of pulling back as if you were in a pilot's seat. Ascom bodly calls it the High Score Joystick.

Having two fire buttons on the base is good for left-handed players, but the trigger-button on the inside of the handle doesn't seem to be much use since the hand is mostly involved in control, not firing, and the forefinger could slip inadvertently.

The base sits on four rubber-suction pads and is wide and heavy enough to give some stability for table top play. But the same features make it awkward to use just holding it in your hands. The Ascom works smoothly with little effort. It takes some practice to get used to the smooth action and sometimes the excess play in it affects your timing.

Unfortunately, a last minute decision by Dynamics Marketing means you can get the Ascom only through the company's German branch. The price may be worth the trouble — DM29.95, about £8.40 at press time.

RATS!

For all the hype around this new concept in joysticks, the Remote Action Transmitter is a disappointment. You control games through touch-sensitive, raised pads on the hand-held unit. That transmits infra-red signals to a diode on a small receiver.

The hand unit supposedly works at a fairly wide angle, but we didn't find that. Not only was it awkward to hold, we had to point it directly at the receiver to do any good. Even then we had to touch the pads just right before we got any reaction from the games. When we did manage, the signal must have travelled very quickly because we noticed no delay in reaction at all. Yet, the RAT just doesn't convey the enthusiasm about a game that one gets through the quickness of a traditional joystick.

Used with the right games and in the correct way, the £29.95 RAT probably would be quite good. But we must recommend you wait to invest your money until the concept is refined.

The chart below shows a range of available joysticks and the evaluations given them by CCI in this or previous issues. New products that have not been reviewed show a "–" in the ratings columns.

MODEL	SENSITIVITY (0-5)	CONSTRUCTION (0-5)	EASE OF USE (0-5)	NUMBER OF FIRE BUTTONS	PRICE	COMPANY
Formula 1	4	5	5	2	£16.95	Kempston Micro Electronics Singer Way
Formula 2	–	4	–	3	£11.95	Woburn Road Ind. Estate Kempston
Competition Pro 3000	3	4	4	3	£12.75	Bedford MK42 7AF. Tel: 0234-856633
Ascom	4	4	3	4	DM29.5	Dynamics Marketing Ltd GR Backerstrasse 11 2000 Hamburg 1 West Germany
Gunshot I	4	4	3	• 2	£8.95	Vulcan Electronics Ltd
Gunshot II (rapid-fire)	4	3.5	3	2	£11.95	200 Brent Street London NW4 1BH
Quick Shot 1	4	4	4	2	£9.95	Tel: 01-203 6366/9
Wico Three-way Deluxe	4	5	3	2	£25	CGL CGL House
Wico Redball	4	4	4	2	£23	Goldings Hill, Loughton
Wico Super Three-way	–	–	–	2	£30	Essex Tel: 01-508 5600
Powerplay	4	4	5	2	£11.95	Protek Computing Ltd 1A Young Square Brucefield Industrial Park Livingston West Lothian EH54 9BX Tel: 0506-415353
Atari	4	5	5	1	£7.90	Atari International Atari House
Trak-Ball	4	4	4	1	£39.99	Railway Terrace Slough, Berks Tel: 0753-33344
Commodore	3	2	3	1	£7.50	Commodore UK 1 Hunters Lane, Weldon Corby, N. Hants NN17 1QX Tel: 0536-205252
Joy Sensor	4	4	2	1	£29.95	Consumer Electronics Failsworth
Starfighter	4	5	5	1	£12.95	Manchester M35 0HS Tel: 061-682 2339
Datapad (Programmable keypad)	–	–	–	–	£29.95	Voltmace Ltd Park Drive Baldock
Delta 35	5	4	5	3	£10	Herts SG7 6EW Tel: 0462-894410
Marconi RB2 Trackerball	–	–	–	–	£59.50	Central Trade Exchange Ltd Ashton Lodge, Ashton Road Dunstable Beds LU6 1NP Tel: 0582-64334
RAT (Rapid Action Transmitter)	4	3	2	1 (pad)	£29.95	Chectah Marketing 24 Ray Street London EC1 Tel: 01-833 4909

Exorcising Demons

Demons of Topaz undergoes rigorous testing by the CCI Readers Panel as Game of the Month.

"Ga'day and welcome to the world of Ozzy, the Australian astronaut. Firstly you see Ozzy's space ship land in front of a lunar landscape, then out gets Oz who resembles a large can of Foster's lager. Now the adventure begins."

The year is 2134 A.D. and this description by 15-year-old Neil Edwards of Bexleyheath, Kent, sets the scene perfectly for Demons Of Topaz by Firebird, the software branch of British Telecom. At £5.95, it is one of Firebird's Gold Edition games.

Ozzy's mission is to find the seven Topaz crystals needed to re-start the ship. But there's a catch. Seventeen-year-old Carl Coffey of Longfield, Kent, elaborates.

"Ozzy's rivalry comes in the form of sleeping Demon Guardians who only awake when Ozzy steps into a crystal's centre (to take it). This also is the only way you can start notching up your score, so you could quite happily jump and leap all night and not score one point."

Julien Francois, 16, of London E12 says, "Luckily you have two things going for you. The Demons are suffering from a hangover and move totally at random. The second is your Sonic Trirang, a sophisticated triangular boomerang. This can kill any Demon in its flight path. The Trirang has momentum so beware! This momentum can be both friend and foe!"

Demons Topaz is in the familiar platform category of arcade games, but our panel of seven readers found this to be one of the better.

"It seems that every man and his dog are doing the platform bit at the moment and Demons of Topaz . . . is no exception, only this is one with a difference," Coffey says. "The actual game has been very well coded, the Demons' presenting smooth, original animation and Ozzy's weaponry, quite appropriately a boomerang, is fun to master."

It is touches like this and an original, entertaining storyline that set Demons of Topaz above some of the others. In fact, our readers noticed the influence of this game's predecessors.

"It features little bits similar to those of other platform games which made them different on their release — collapsing

floors and prickly plants from Manic Miner, the Bruce Lee elevators, the scrolling of Son of Blagger and silly sprites China Miner style," observed Tim Burke, 15, of Manchester.

Paul Serbert, 22, of Harrogate, says, "Some of the graphics are pretty good, particularly Ozzy who is the smoothest mover I've seen for a long time."

The demons in their various forms were the highlight for Julien Francois. "The game boasts sufficient means for your demise — demons, asphixiation, killer plants, water, high falls, etc.

"Lacking in Demons Topaz is not," he says. "I counted over 21 with some real weirdies such as a pig on a Penny Farthing, bouncing pumpkins, killer Commodore signs, loads of spinning thingummajigs and bubbling Volkswagons to name but a few."

Fourteen-year-old John Archer of Ashbourne, Derbyshire, observes, "You must jump deftly from platform to platform, watching out for the floor that falls away and the conveyor belts."

"It was slightly original as an idea though the layout of the graphics quite unoriginal, with typical ladders, different levels and conveyor belts"' says 13-year-old Luci Kershaw of Teddington, Middlesex.

The mechanics impressed Paul Serbert. "For a change, the keys are as easy to use as the joystick."

Brightly coloured graphics greet you above and below ground on the asteroid Topaz. John Archer says the graphics "help the game considerably. They are colourful and the sprites used are very complicated and well animated."

Several title screens accompany lively renditions of tunes like Toreadore. Firebird seems to have taken the best of the platform world and implanted it firmly in Topaz to make it a game that, while not overwhelming, grows on you.

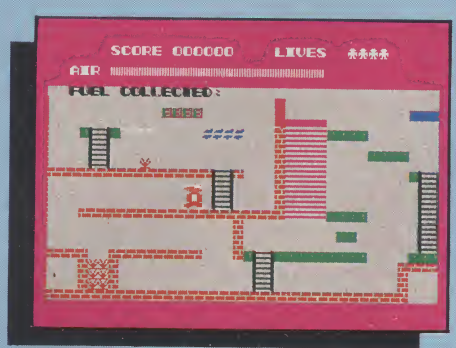
Our panel's conclusions:

"Overall the game is a gloryfied version of Manic Miner, so is **very addictive**," — Neil Edwards.

"At first the game didn't make a big impression on me but it is now obvious that a **depth of planning** went into creating the well laid out screens, careful thinking on the player's part will yield short cuts that save precious time," — Julien Francois.

"I do think Firebird deserves **a pat on the back** for a game which I think may be quite successful," — Luci Kershaw.

The challenge was enough to yield "much **tearing of hair** and gnashing of teeth," — Tim Burke.



"It is **extremely addictive** and an excellent value for money," — John Archer.

"**Good value** for money," — Paul Serbert.

"Its addictiveness grows from **strength to strength** and had me going back to the good old 64 many times. In fact, the urge to decend into the caves of Topaz is growing ever stronger. So it looks like once again all you 64 owners will be forking out money, and at only £5.95 Demons of Topax is money well spent," Carl Coffey.

SX-64 on tape

The lack of a cassette port has been a major criticism of Commodore's SX-64 since its launch last year. John Mann reveals that it is possible to interface a cassette recorder to the SX-64. Here's how...

Commodore's SX-64 'executive computer' is good value for money ... as long as you don't pay the recommended price! (I bought mine from a major hi-fi chain store for under £500). As well as the Commodore 64-based CPU, its sturdy case houses a 5" colour monitor and 1541 disk drive. Its detachable keyboard is a joy to use, and wordprocessor, financial and stock-control software comes free with the machine.

However, in designing the SX-64, Commodore seem to have had a lapse of common sense; while providing cartridge, user, serial, joystick, and video/audio ports, they decided to omit the cassette port. Perhaps they thought either that 'executives' were so excited by wordprocessing that they didn't want to play games, or that 'executives' could afford the inflated prices of disk software. Wrong on both counts, in my opinion.

Soon after I purchased my SX-64, I telephoned Commodore at Corby to explain the error of their ways, and asked them if there was any way to interface a cassette recorder — perhaps they had a special recorder which plugged into the serial port? 'No', was their reply. Not being one who takes 'no' for an answer, I started to delve deep inside the machine, and proved them wrong...

How Cassette Loading Works

Before I describe how I made my SX-64 read tapes, a few words about how this is done by the ordinary C64.

Locations 0 and 1 in the C64's memory are actually contained within the 6510 microprocessor ic, and act as an 8-bit input/output port; location 1 is the actual port and location 0 is the port's data direction register. Depending on the state of each bit in location 0, each corresponding bit in location 1 is configured as either an input or an output. The bits we shall be concerned with are described in Fig 1.

As you can see, the cassette recorder is connected to bits 4 and 5 of the port, directly in the case of the PLAY sense line (bit 4). Bit 5 controls a transistor switching network, within the C64, which provides power to the cassette motor. The TTL output from Commodore's cassette recorder is connected directly to the FLAG pin on the keyboard CIA (Complex Interface Adapter).

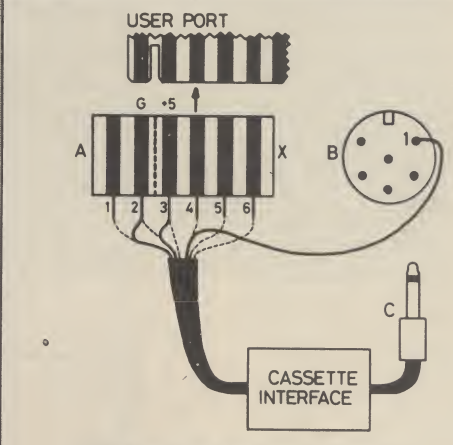
When the C64 is given a LOAD Command, control is passed to the Operating System (KERNAL) ROM, which first checks which peripheral device is being addressed. If the device number following the file name is '1', or if no device number is given, KERNAL carries out a load from cassette; through the 6510 port, it checks that the PLAY button is depressed on the cassette recorder and, if so, supplies power to the recorder. Cassette data is then read via the CIA.

System 1

So, my problem was to find the relevant connections on the SX-64. Or to at least find the cassette read line (CIA FLAG), because the other two lines seemed to be largely redundant since the SX-64 holds the 'PLAY depressed' sense line continuously low, and disables the screen whenever the cassette motor should be running (thus allowing eye and finger power to do the rest!). Examination revealed that the cassette read line is easily available at pin 1 of the serial port (SRQ IN).

The rest is easy, you may think. Not so! When I tried a 'LOAD "",1', the SX-64 replied 'Illegal Device Number', just as it would if one tried to load, for example, from the screen. A quick disassembly of sections of KERNAL revealed all; although the SX-64 KERNAL contained all the cassette routines, they had been 'blocked' by a single byte of code early in the LOAD chain. However, this problem was not insurmountable. Fig 1 shows that bits 0 and 1 of the 6510 port can be altered to replace KERNAL and BASIC with sideways RAM. It was a simple matter to write a short program which transfers both BASIC and KERNAL to their sideways RAM, re-enables the cassette routines and switches out the ROM completely (see Fig 2). It worked! 'LOAD "",1' made the screen go blank — the SX-64 was trying to read from cassette.

All I needed now was a cassette player. The C64 uses a dedicated recorder which, as mentioned earlier, is powered from the computer and processes its audio output to provide the TTL square wave required by the CIA. It is probable that the SX-64's power supply would be unable to provide the current necessary for the cassette motor, so I decided to purchase an 'ordinary' cassette recorder and one of the C64 cassette interfaces which are readily available. The computer end of the interface was modified as shown in Fig 3. You will notice that the interface is powered with +5v from the User Port.



1. Disconnect all wires from cassette port connector 'A', then reconnect wires 1&2 to pins 2&3. Slot end 'X' with a sharp knife, to fit user port.
2. Connect wire 4 to pin 1 of a 6-pin DIN plug 'B'.
3. Connect 'A','B' & 'C' to User Port, Serial Port and Cassette Earphone Socket.

Fig 3: Interface Modification.

This is the first system which you might like to try on your SX-64. Its advantage is that it doesn't entail opening the case. Connect the interface and cassette recorder, power up, and run the program in Fig 2. Ensure that 'stop' is pressed on the cassette recorder, and type 'LOAD (Return)'. When the screen goes blank, press PLAY on the cassette recorder. After a few seconds, the screen will display the message 'FOUND program name'. Immediately, press the Commodore Logo Key. The screen will again go blank, and will remain so until the program has loaded.

System 2

System 1, albeit simple, works fine for many programs, but will not work with longer programs which use the sideways RAM (because they overwrite your modified KERNAL), nor with fast-loading programs, which generally begin by loading KERNAL into RAM, thus de-modifying your KERNAL. The only way around this is to purchase a KERNAL ROM for a normal C64. I was able to obtain one for about £20, and found it easy to fit — remove the top half of the case, locate the ROM on the CPU board (Fig 4), ease out the old ROM from its socket and gently press in the new one.

As well as allowing full cassette functioning, fitting the C64 KERNAL gives a blue display on initial power-up, rather than the SX-64's prettier colours, and also gives cassette rather than disk loading from 'Shift/Run-Stop'. As far as I can tell, these are the only differences between the KERNALs.

System 3

The only problem with KERNAL replacement on its own is that, because fast loading programs generally do not disable the screen while loading, it is difficult to know when to switch the recorder on and off during the loading of multi-part programs. I also found that some programs check that the PLAY button is released before starting the load. The cure for these problems is simple (Fig 5), but requires three wires to be soldered to the CPU board within the SX-64, and a small switch and an LED to be attached inside the 'storage' space above the disk drive. Pressing the switch fools the computer into believing that PLAY is released, and the LED lights whenever the cassette should be running. System 3 has loaded all but one of the fast loading programs I have tried (this was probably due to inadequacies in the cassette player or interface).

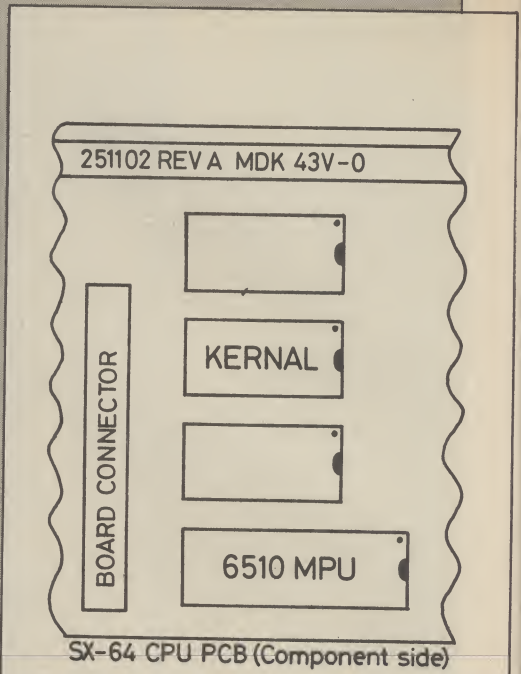


Fig 4: Location of KERNAL and 6510

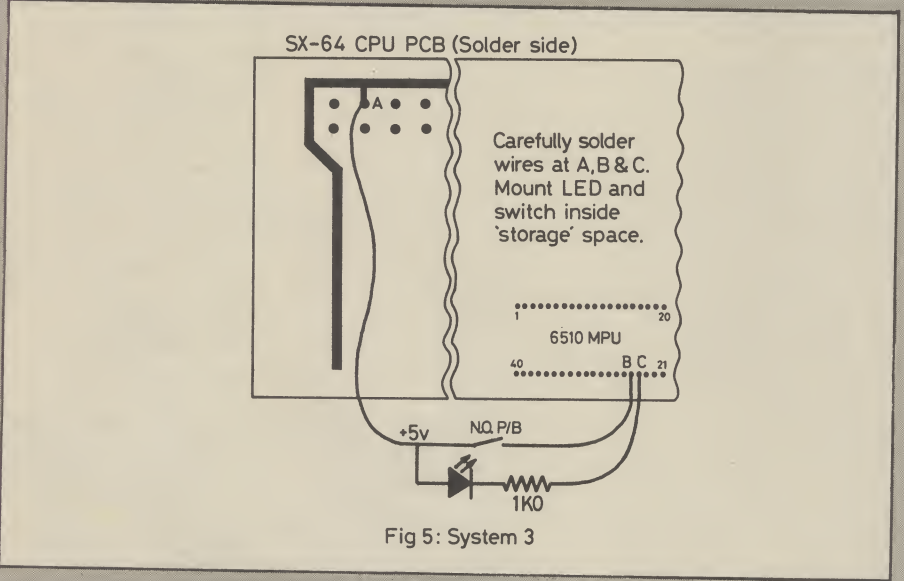


Fig 5: System 3

Conclusion

Since I fitted System 3 to my SX-64, only recently, I have more than recouped the initial outlay in reduced software costs. I have also been able to use software not available on disk — and this includes many new games programs on the market.

However, before you dig out your (fine-tipped) soldering iron, remember that working inside the SX-64 will negate your warranty, and there is always the chance that you might damage the machine while you work. Beware!

BIT	DIRECTION	VALUE	DESCRIPTION
0	OUTPUT	1	6510 reads BASIC ROM at $A000-$BFFF
		0	6510 reads RAM at $A000-$BFFF
1	OUTPUT	1	6510 reads KERNAL ROM at $E000-$FFFF
		0	6510 reads RAM at $E000-$FFFF
4	INPUT	1	Cassette PLAY not depressed
		0	Cassette PLAY depressed
5	OUTPUT	1	Cassette motor off
		0	Cassette motor on

Fig 1: 6510 Input/Output Port

```
10 REM ** SIMPLE TAPE CONVERSION FOR SX-64 **
20 REM ** LINES 30 & 50 PLACE KERNAL & BASIC IN RAM **
30 FOR I=57344 TO 65535:X=PEEK(I):POKE I,X:NEXT I
50 FOR I=40960 TO 49151:X=PEEK(I):POKE I,X:NEXT I
60 REM ** LINE 70 MODIFIES KERNAL AND ACTIVATES RAM **
70 POKE 62647,123:POKE 62969,95:POKE 64982,5:POKE 1,5
```

Fig. 2: Simple Tape Conversion Program

Putting it to the test

Following the advice in our last two issues on how to avoid programming errors, David Bowdrey provides a sensible approach to program testing

Why test a program? Well, whilst it is not damaging to be threatened with court action for an unpaid account of £0.00, it is annoying and wasteful of your time in having to set the record straight. However, it's another matter altogether to receive a domestic gas bill for several thousand pounds or to have your credit rating moved onto a black list because of a "computer error!"

Moreover, the growing use of computers to control machinery, including passenger transport, could lead to very tragic results were programs to be let loose without testing. In all computer programs the target should be a level of excellence approaching perfection. At the very least, the standard should be such that the user can have a justifiably high level of confidence that the program will behave rationally at all times. Thorough testing is the only sure way to complete the construction of a sound program.

Testing is the process of running a program, or subprograms, with the intention of finding errors. When you set out merely to prove that the program performs the design task you miss all but the most glaring of faults. By setting out expressly to find errors, you have a far higher probability of finding most of them. Be aware of, and try to resist, the self-induced pressure to call a program complete that arises with all programmers once a whole and apparently working program is up and running. Carry out the testing with diligence and a genuine desire to discover the faults.

Such an approach pays dividends by improving the programmer's standards but, above all, it is also the only way that has the remotest chance of producing a truly excellent program with that elusive quality of a high level of user confidence. It is not without reason that costed software projects allow 40-50% of the project time for the test phase. Even if you are convinced that you are that much sought after programmer who can write error-free code, do not cut down on the test phase!

Program Definition

Before a program can be put through any worthwhile test the purpose of the program must be clearly defined. It is not a good practice to define the purpose of a program from the results of its testing!

The initial design specification for the program is the starting point. If that was ill conceived then the whole program is likely to be unstable; besides being virtually untestable. The specification must include the required inputs and outputs. Not vague descriptions and generalities, but solid, clearly defined items and their bounds. A precise specification is also the location of the criteria by which successful completion of the program will finally be decided. Determining the end point of the testing is one of the toughest features of testing. That is, knowing when to call it a day. A sound and detailed specification is a great help.

Loose specifications will lead to apparent errors. Where the program definition was not rigorous then the user may obtain results that he was not expecting. These may be described by the user as program errors. Even though the program performs within the specification as interpreted by the programmer, the user will still cry, "Error!" from the roof tops when the program fails to meet his intended purpose. Remedial action for such errors may become effectively, a program rewrite. With an eye on the testing, and subsequent fault correction, ensure that the specifications are rigorously defined, and understood by all the parties involved in the production and use of the program, before writing one stroke of coding.

Program Design

Testing of a program begins at the design stage. The design and structure of a program radically affects the manner and effectiveness of the subsequent testing.

Ideally, informed design and documentation, good structure, sound coding practices and attention to error entrapment throughout, should negate any need for program testing. Sadly, it is not so. The time spent testing a program is often as long as all the other phases put together. Well developed programming practices can at least keep the testing to an acceptable minimum.

During the design phase watch out for the exception. Exceptions generally prove to be the most awkward items to code, the most difficult to test, and the most often wrong!

Whatever design philosophy you adopt when producing a program it is necessary to choose a test procedure that will ensure that all areas of the program are tested whilst not resulting in lifetime employment for the tester! A structured approach to programming allows for a similar approach to testing. By testing each section of a program the overall health of the program may be determined. For this reason the design of the program should strongly favour a single entry, single exit block structure. Not only does such an approach aid the control of data flow, but it also permits modular testing and the determination of values being passed between blocks.

Coding Standards

The simplicity and clarity of the coding greatly influences, if not determines, the manner of testing. But most of all, they determine what can be done about any faults found during the tests. It is all very well finding the fault but if the coding is so fancy or obscure as to make any alteration the practice of faith, rather than the application of science, then the whole programming effort may as well have been spent on some more fruitful pastime.

Outside Help

The emotional involvement of the programmer in "his" program should not be underestimated. A programmer may not want to see any faults in his (or her) program. Equally, knowing what should be

there usually leads to what is there being read as what should be there! The programmer is preprogrammed to subconsciously fill-in missing items or to "fix" the understanding of ambiguous details. The resolution of faults arising from such problems of semantics can often be readily achieved by the involvement of an outsider. An outsider being an individual who meets any criteria of confidentiality that may apply to the program under test. Calling in a skilled or unskilled programmer not directly involved with the program in question to assist in, or carry out, the tests is the most successful technique for producing a fault-free program. Such a move has the added advantage of improving the styles and enhancing the experience of both people.

However, the practice of outsider involvement does require well designed, well structured and clearly coded programs or the time penalty in understanding the workings of the program, and the diminishment of interest for the helper as a consequence, is far too great. The practice also requires mature individuals. Use of a Devil's Advocate to question the program and provide the occasional touch of moronic behaviour (within sane limits) is effective in highlighting a program's faults. However, it is unlikely to cement any friendships! A readiness to seek, and accept, specialist advice is a desirable trait in any programmer.

The enlisting of outside help is a must for major programs. Finding that outside help is a sound reason for the enthusiastic amateur to join a computer club. A co-operator is not necessarily a good substitute for an outsider. He (or she) may be equally bound-up in the program.

The Plan

The first requirement of program testing is to make a plan. It is important to plan the details of the tests. Remember, the definition of a good test is one that has a high probability of discovering the faults. Use the program specifications and design as the skeleton for the plan. Define the manner of testing of each module. Include static (longhand) testing of the program. Where appropriate, construct decision tables to confirm that all possible combinations of throughput (input and output) have been covered, either in full or by representative sample. Establish performance norms for the program. Set the standards to which each section of the program is to be subject. The minimum standard of test data to be used should be:

Wild data of low limit −1.
The low limit value.
A mean value.
The high limit value.
Wild data of high limit +1.

To keep the volume of testing within reason, the maximum standard of test data should be the minimum standard plus:

Wild data of low limit ×10 (or some rational figure).
The low limit +1.
The high limit −1.
Wild data of high limit ×10 (or some rational figure).

During the testing of program modules be prepared to instrument the code (adding flags to each line or conditional branch) to determine whether statements are being executed. Where non-execution is highlighted, provide further range of tests so as to cause the statement's execution, or consider the statement's removal. Very careful analysis of why the statement was originally included should be undertaken before declaring any statement redundant. Whenever instrumentation is adopted as part of the test procedure it is imperative that all such instrumentation is thoroughly recorded. Failure to remove an instrument after completion of the test, or the removal of an integral part of the code by mistake, will undo all the good works of the testing.

The test plan should ensure that the program is worked realistically. Long term operation may effect the program where machine timing is employed. Data transfer of maximum file sizes with full records may prove to be unacceptably long winded. Large scale printing may require adoption of another approach (eg. disk storage of required output plus a separate print from disk program). Sorting of maximum data quantities starting from a complete inverse of the desired order may give the impression of machine failure. The chosen method of sorting may be adequate for limited quantities of data but may need to be completely revised for the more normal quantities and data types of the intended program usage.

Record the details of the tests made, the data used and the results obtained. Such details will be of major importance when undertaking future modification to the program as a whole, or any of its modules.

When planning the testing it is important to give consideration to the thought of abandoning the tests. As the number of faults found rises so does (against all intuition) the probability of there being further faults yet to be discovered. When the level of faults becomes high, and that is a subjective judgement, serious consideration must be given to going back to the beginning. In such an instance, the methods of the programmer as well as the requirements of the program may require scrutiny.

Static Testing

All programs should be hand run. Such static testing falls into 3 sections:

Reading the listing.
Hand calculation of the required results.
Playing at being the computer (a walk through).

Reading the listing is a good start where outside aid has been enlisted to test the program. It often identifies problems of semantics (the meaning of the code) as well as revealing the true structure of the program (as opposed to the designed one!). The opportunity to confirm the agreement of code and REMarks is also presented. This last is quite critical for future program modification.

The hand calculation of the required results is important in establishing the norms for the program. It enables details of the test plan to be filled-in at an early stage. Note well! It is important that the formula used for any given calculation should be that as used in the real world and not as encoded in the program.

A walk through of the program, emulating the computer, establishes the behaviour pattern of the program and the manner of its data movement. The walk through should take the main route through the program with valid data. Any calculations made should employ the encoded formulae, the results so obtained being compared with those obtained in the longhand calculations. Note of the error entrapments, existent or required, should be made. No attempt to hand test the error traps should be made in any but the smallest programs. That is unless time has no meaning for you.

Performance Testing

Performance testing is that testing which determines that the program satisfies the requirements of its specifications with respect to such qualities as data handling (sizes of files, arrays, etc.) and timings. It is important to test for data structure clashes. An example of such a clash is when a list is filed in (say) surname order yet the output is required in (say) customer number order. Incomplete fields in records, fractional numbers, etc., lead to data clashes. Check for the possibility of data type mismatches. Only when it effects the use of the program should the question of its time of execution be actively investigated. Unnecessarily seeking after a fast program can impose subsequently disastrous coding techniques and program structures.

Module Testing

Individual program blocks, subroutines and functions should be thoroughly tested before integration with other sections of the program. Such low level testing will simplify the overall testing, and any subsequent fault correction. With individual modules performing correctly, the confidence level for the program as a whole will be well founded. Each module must be tested with rigorously defined input. The subsequent output must conform to an equally rigorously defined output. Working with assumed values of input (which must be valid), a proven (and equally valid) output must be obtained. Additionally, the acceptable inputs need to be well defined, with the coding ensuring that they are so confined. This phase of testing can be said to be the most important. Do not skimp it! By applying sound testing procedures to library routines, the time spent on module testing can be shortened.

Testing Integrations

As each module passes its test it is integrated with the other tested modules. At each integration of modules dummy values, false breaks and instruments are removed; whilst the larger block of code will pass around new parameters. All these changes require that the program be tested at each integration. By thoroughly testing at each integration, it is possible to narrow the area of the search for a fresh fault. The subsequent correction of that fault also carries a lower retesting overhead in both the range of the test and the time to run it. Where defensive programming (the rejection of invalid input data) has been employed in the coding of a module, it is necessary to ensure that the response to any input rejection is satisfactory when the module is buried by the integration.

Total System Testing

With the approach of progressively testing at each module integration, we suddenly arrive at a tested whole program. At this stage it becomes necessary to consider the system of which the program is a part. the system, including a particular computer (there may be subtle changes in modification state if a different machine is being used to run the program for real, albeit of the same make and model), any peripherals such as a printer or disk drive, and the program itself, must be tested as a whole. The aims should include a test of rational behaviour under wild data inputs. Remember, leave the excursions to National Coaches!

Acceptance Testing

Acceptance testing is the user devised and executed tests to determine the program's acceptability to the user. Both the devising of the tests and their performance assumes that the user is able to carry out such functions. Where the user is ill-prepared for such a responsibility, great tact and diplomacy is required on the part of the programmer in "selling" the program's acceptability. The onus falls on the programmer to ensure that the program is most thoroughly tested before it is set before the user. The initial fault pattern displayed to any user, but particularly a naive one, often determines the confidence level bestowed on the program. Embark on this phase of testing only when positive that the program is presentable. Never, NEVER, let a naive user try out an untested program. The resultant trauma could turn the individual away from computers for ever!

Program Maintenance

Once the program is finished and in service, modifications to the program as a result of either faults or subsequent specification changes also require thorough testing. The details of the test procedures, and the results obtained when they were run, should be kept throughout the service life of the program to aid post-modification testing. The maintenance of a program (of any significance) may represent 50% of the total effort expended on a program during its life, from inception to the waste bin. It follows that the thought given to future modification and the care exercised while designing and building a program will greatly effect its maintainability.

Corrupting Testing Practices

Avoid intentional failure techniques. Do not deliberately corrupt code just to determine the nature of the error that it may produce. Keep testing on a positive plane. Do not alter code, with a temporary "fix", to lessen the range of the program in order to shorten the test run time. Such fixes may well mask major shortcomings in the program.

Debugging

Debugging and testing a program are often taken as being the same activity. They are not. Testing, as outlined above, has many interrelated facets all aimed at delivering a "perfect" program. Debugging is the determination of the cause of a fault found during testing and the provision of remedial action. Following any debugging it is necessary to retest the program.

If you have come across any useful hints and tips, why not share your knowledge with other CCI readers?

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Mighty Micromon

Every byte is valuable if you own a VIC with its limited 3.5K of memory. Mike Hart has developed Micromon, a machine language monitor for the VIC which occupies just 195 bytes

Although I perform any serious development work on my 64, it is also pleasant to know that machine code routines, amongst others, will transfer over onto other machines such as the VIC-20. I recently did the 'unthinkable' and bought myself a VIC complete with its massive 3.5K of memory — however at £25 one can hardly grumble!

Having bought the VIC I am amazed that 2 million of them have been sold worldwide because the number of books and/or other information specifically devoted to them is miniscule. In a local bookstore there must have been two dozen books devoted to the 64 but only one to the VIC so my sympathies go out to all of those VIC owners who regularly complain that they are neglected by authors.

After I had loaded in the VIC Disk Operating System (only 300 bytes!) supplied with the test disk for the 64 and then added an adapted version of SUPERMON (of which more later), I only had 1200 bytes left — hardly sufficient to try out even the smallest routine. This gave me the spur to develop MICROMON which, as its name implies, is a miniscule machine-language monitor — in fact it only occupies 195 bytes and this plus the VIC disk operating system between them occupy less than 0.5K leaving you with a 3K completely free for BASIC. When you have as little as 3.5K then every byte suddenly becomes precious!

Loading MICROMON

The listing gives a relocating loader (in BASIC) for MICROMON. This means that MICROMON will automatically be located at the top of memory and the top-of-memory pointers are then adjusted to keep the routine safe from BASIC itself. You can demonstrate this for yourself by running the program and then noting the contents of PEEK(55)+256*PEEK(56) which is the top-of-memory value. Running the routine a second time and then performing similar PEEKS will reveal that the routine when run a second time has relocated itself underneath the first version of the program.

If you prefer then you can replace the CLR in line 90 with a NEW and this not only resets the relevant pointers, but also makes the loader program disappear as well.

How to use MICROMON

To access MICROMON then use the following procedure:
SYS(784) followed by any decimal number or expression eg SYS(784) PEEK(55)+256* PEEK(56)
will enter the monitor at a point where MICROMON is looking at itself. Repeatedly pressing RETURN will give you another four-figure hexadecimal number followed by a colon, two spaces and eight pairs of hexadecimal bytes (split over two lines of the screen). To return to BASIC simply press the space bar. You may change this location to SYS(700) by making the locations in line 90, 700, 701, 702 if you wish.

MICROMON also gives the facility to go forwards and backwards in memory to view locations and also a limited facility to change bytes — but only one at a time. To demonstrate this facility, it is better to access an area of memory where no damage can be done such as the cassette buffer by SYS(784) 828.

If you now press the equals sign (=), a colon appears on the start of the next screen line. This is MICROMON's prompt to you that a four figure hexadecimal number is required. If you type a number such as 0384 and immediately press return then MICROMON will jump to that place in memory and read out the value of the next eight bytes — you can carry on pressing RETURN to display the rest of the memory that follows.

To change a byte in memory then follow this procedure:
type = (as before) followed by a 4-figure hexadecimal number but do not press RETURN at this stage. Insert a colon and then type the two digits of the hex number that you wish to place into that memory location. As soon as the second digit is entered then MICROMON will print out the line of 8 hex digits that follow that memory location. To alter another memory location then remember to press = followed by the (hex) number of the next memory location, a colon and the number you wish to enter.

This facility is very limited, but at 200 bytes it might be all that is needed if all you wish to do is to view how BASIC is stored and perhaps change a byte here and there to see what happens. If you like you could try the following exercise:

Put the values A9 41 20 D2 FF 60 in locations $0333C-$0341 and then RETURN to BASIC (by pressing the space bar). Typing SYS(828) will now print out the letter A on the screen — this is hardly inspiring but it may be your first ever machine language routine. From small beginnings you never know where you will end up.

SUMMARY OF MICROMON COMMANDS

To enter	-	SYS(784) Number or expression in decimal
To view memory	-	press RETURN at the end of every line
To view new portion of memory	-	press = followed by four figure hex number, followed by RETURN
To change a byte	-	press = followed by four figure hex number followed by a colon followed by a two figure hex number
To exit		press space bar.

A 'quick-and-dirty' adaptation of SUPERMON for the VIC-20

SUPERMON is very easy to get hold of for the 64. Here is how to adapt if for the VIC-20. The program is self-relocating to make life easy and there is one ROM call that we have to change and a few colour changes. This is the procedure:

(a) Start off with a completely 'clean' machine with the minimum of memory in it, ie 3.5K. Load SUPERMON **but do not run it**!

(b) LIST the program and you should see a line that changes the background colour on the C-64. On my version it is a line 125 which reads POKE 53281,12. If you have a line like this then change it to POKE 36879,25 (white border and screen on the VIC). If there is no such line then do not try to add it but do this manually each time you load SUPERMON

(c) Perform the following three POKES: POKE 4448,144: POKE 6265,144: POKE 4806,192

(d) SAVE the program under a new title such as VICMON.

If you now RUN the program you should enter the monitor and should be able to use the facilities provided by SUPERMON eg Assemble, Disassemble etc. I said previously that this a 'quick-and-dirty' adaptation for the following reason — the display still assumes a 40 column display and therefore some of the disassembly will look untidy when it spills over onto the second line. For the same reason it is not possible to alter a single byte of the disassembly and have the whole screenful disassembled again as is possible in 64 SUPERMON. In a case like this, it is best to place the cursor on the first digit of the location number, perform INSERT followed by a colon and then cursor right to alter the individual byte in question. Similarly the normal disassembly will give more than a screenful on the VIC so it is best to use the .P command rather than with .D command. With the .P command you specify the start and end points of your disassembly.

Despite these shortcomings, I think you will find that this is one of the easiest and quickest ways to get SUPERMON for your VIC. A version (with colours!) was published by David Hook in *Commodore Computing International* way back in October 1982 but that takes a day to type in and assumes access to a PET!

Having access to a machine language monitor will certainly open up a whole new world on your machine. Incidentally, MICROMON works just as well on a 64 — except that with the easy availability of SUPERMON and 38K of memory there is not a lot of use for it.

```
READY.
MICROMON

1 REM ***     MICROMON    ***
2 :
3 REM  **  BY MIKE HART **
4 REM          (1985)
5 :
10 N=195:T=PEEK(55)+256*PEEK(56)-N
20 FOR J=T TO T+N-1:READ X:IF X>=0 THEN 50
30 X=T-X:Y=X-INT(X/256)*256:POKEJ,Y
40 X=X/256:J=J+1:READ Z
50 POKE J,X:NEXT
60 IF PEEK(792)=71 THEN POKE T+2,173:POKE T+5,183
70 H=INT(T/256):L=T-H*256
80 POKE 55,L:POKE 56,H:POKE 51,L:POKE 52,H
90 POKE 784,76:POKE 785,L:POKE 786,H:CLR
100 DATA 32,138,205,32,247,215,24,144
110 DATA 19,106,106,106,106,41,15,24
120 DATA 105,48,201,58,144,2,105,6
130 DATA 32,210,255,96,165,21,32,-9
140 DATA 3,165,21,32,-13,3,165,20
150 DATA 32,-9,3,165,20,32,-13,3
160 DATA 169,58,32,210,255,169,32,32
170 DATA 210,255,32,210,255,160,0,177
180 DATA 20,32,-9,3,177,20,32,-13
190 DATA 3,169,32,32,210,255,200,192
200 DATA 8,208,236,32,228,255,201,32
210 DATA 240,193,201,61,240,20,201,13
220 DATA 208,241,32,210,255,24,169,8
230 DATA 101,20,133,20,144,174,230,21
240 DATA 176,170,169,13,32,210,255,169
250 DATA 58,32,210,255,32,-163,3,133
260 DATA 21,32,-163,3,133,20,32,228
270 DATA 255,201,13,240,14,201,58,208
```

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```
280 DATA 245,32,210,255,32,-163,3,160
290 DATA 0,145,20,169,13,32,210,255
300 DATA 24,144,201,32,-178,3,10,10
310 DATA 10,10,133,252,32,-178,3,101
320 DATA 252,96,32,228,255,240,251,32
330 DATA 210,255,201,58,41,15,144,2
340 DATA 105,8,96
READY.

READY.
B*
   PC  SR AC XR YR SP
.;0008 B0 00 00 00 F6
.
1D3D 20 8A CD    JSR $CD8A
1D40 20 F7 D7    JSR $D7F7
1D43 18          CLC
1D44 90 13       BCC $1D59
1D46 6A          ROR
1D47 6A          ROR
1D48 6A          ROR
1D49 6A          ROR
1D4A 29 0F       AND #$0F
1D4C 18          CLC
1D4D 69 30       ADC #$30
1D4F C9 3A       CMP #$3A
1D51 90 02       BCC $1D55
1D53 69 06       ADC #$06
1D55 20 D2 FF    JSR $FFD2
1D58 60          RTS
1D59 A5 15       LDA $15
1D5B 20 46 1D    JSR $1D46
1D5E A5 15       LDA $15
1D60 20 4A 1D    JSR $1D4A
1D63 A5 14       LDA $14
1D65 20 46 1D    JSR $1D46
1D68 A5 14       LDA $14
1D6A 20 4A 1D    JSR $1D4A
1D6D A9 3A       LDA #$3A
1D6F 20 D2 FF    JSR $FFD2
1D72 A9 20       LDA #$20
1D74 20 D2 FF    JSR $FFD2
1D77 20 D2 FF    JSR $FFD2
1D7A A0 00       LDY #$00
1D7C B1 14       LDA ($14),Y
1D7E 20 46 1D    JSR $1D46
1D81 B1 14       LDA ($14),Y
1D83 20 4A 1D    JSR $1D4A
1D86 A9 20       LDA #$20
1D88 20 D2 FF    JSR $FFD2
1D8B C8          INY
1D8C C0 08       CPY #$08
1D8E D0 EC       BNE $1D7C
1D90 20 E4 FF    JSR $FFE4
1D93 C9 20       CMP #$20
1D95 F0 C1       BEQ $1D58
1D97 C9 3D       CMP #$3D
1D99 F0 14       BEQ $1DAF
1D9B C9 0D       CMP #$0D
1D9D D0 F1       BNE $1D90
1D9F 20 D2 FF    JSR $FFD2
1DA2 18          CLC
1DA3 A9 08       LDA #$08
1DA5 65 14       ADC $14
1DA7 85 14       STA $14
1DA9 90 AE       BCC $1D59
1DAB E6 15       INC $15
1DAD B0 AA       BCS $1D59
1DAF A9 0D       LDA #$0D
1DB1 20 D2 FF    JSR $FFD2
1DB4 A9 3A       LDA #$3A
1DB6 20 D2 FF    JSR $FFD2
1DB9 20 E0 1D    JSR $1DE0
1DBC 85 15       STA $15
1DBE 20 E0 1D    JSR $1DE0
1DC1 85 14       STA $14
1DC3 20 E4 FF    JSR $FFE4
1DC6 C9 0D       CMP #$0D
1DC8 F0 0E       BEQ $1DD8
1DCA C9 3A       CMP #$3A
1DCC D0 F5       BNE $1DC3
1DCE 20 D2 FF    JSR $FFD2
1DD1 20 E0 1D    JSR $1DE0
1DD4 A0 00       LDY #$00
1DD6 91 14       STA ($14),Y
1DD8 A9 0D       LDA #$0D
1DDA 20 D2 FF    JSR $FFD2
1DDD 18          CLC
1DDE 90 C9       BCC $1DA9
1DE0 20 EF 1D    JSR $1DEF
1DE3 0A          ASL
1DE4 0A          ASL
1DE5 0A          ASL
1DE6 0A          ASL
1DE7 85 FC       STA $FC
1DE9 20 EF 1D    JSR $1DEF
1DEC 65 FC       ADC $FC
1DEE 60          RTS
1DEF 20 E4 FF    JSR $FFE4
1DF2 F0 FB       BEQ $1DEF
1DF4 20 D2 FF    JSR $FFD2
1DF7 C9 3A       CMP #$3A
1DF9 29 0F       AND #$0F
1DFB 90 02       BCC $1DFF
1DFD 69 08       ADC #$08
1DFF 60          RTS
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The best of LET

Viola Gienger sums up a few of the high points.

An alternative to Commodore's notoriously slow 1541 disk drive was one of the highlights of the LET exhibition held recently in London.

Manufactured by the Portugal branch of Timex, the watch people, the Floppy Disk Drive system uses the company's own operating system called TOS (Timex Operating System). TOS works as an extended Basic using none of the computer's memory, so existing software will run without modification. It allows printing to and inputing from RS232 ports using commands from a Basic program, supports random and sequential access files and uses a tree-like directory structure.

At a price of about £250 when it is released, the package includes controller unit, one disk drive, power supply, interface, disk drive cables and a power supply lead along with a user manual.

The German distributor for the Timex system, Profisoft, introduced two of its own products at the same time.

A machine code program to extend Basic's graphic capabilities is the heart of the Graff package. It includes a manual with programs for generating sprites and characters without using Basic's POKE command.

Profisoft also produces the CBM 64 Assembler/Dissassembler, a 2-pass program with monitor and editor. It includes two 4K programs, a 2-pass assembler and an extended editor. The assembler and editor are stored as one program on disk. Each of the packages retails at £14.95.

Contact: Micro Interface, 84 Talbot Road, London N6. Tel: 01-340 0310.

The light fantastic

Jeff Minter apparently took some time out of his llama-ridden world recently to create something quite different.

The result is Psychedelia, a light synthesiser that isn't a game but uses a joystick to control colourflows and lightforms. With versions for the 64, VIC 20 and C16, Llamasoft should do quite well with this unusual offering. Minter suggests playing the synthesiser to music for "a solid total freakout."

The software allows the parameters that generate patterns to be changed and the lightforms to be edited. The results can be saved to tape on the 64 version to be played back later.

The C16 and VIC 20 versions are £6 on cassette and the 64 version retails for £7.50 also on cassette.

Contact: Llamasoft Software, 49 Mount Pleasant, Tadley, Hants RG26 6BN. Tel: 07356-4478.

Originality

Mikro-Gen must be praised for the most original and creative stand at LET. It was populated by "the Gang" that will be the subject of the latest game, including a green paint-covered toddler named Herbert.

The game is "Everyone's Wally" and though it doesn't speak highly of you or I, we're likely not to mind too much. The theme song will soon have you calling yourself a Wally along with Wilma, Tom, Dick and Harry.

The company, just over three years old, has consistently used such colourful characters with Pyjamarama's Wally Week just one example. Mikro-Gen says it will follow the latest release with more titles based on Herbert as he grows up. Meanwhile, "Everyone's A Wally" retails for £9.95 on tape.

Contact: Mikro-Gen, 44 The Broadway, Bracknell, Berks. Tel: 0344-427317.

Expert in the home

Audiogenic aggressively pushed a whole range of products in the hardware sector to supplement the business and games software that's traditionally been its major stock in trade.

One of its most interesting prospects is Exper, a program claiming to help create expert systems, those sophisticated specialist programs that have so far remained in the domain of mainframe or mini-computers.

Other upcoming splashes from Audiogenic include Entrepo, a micro wafer drive for the 64 and VIC 20, giving those two mainstays of the Commodore line a mass storage device that could take the place of a disk drive.

A standard Commodore cassette unit can be plugged into the micro drive to copy programs from audio cassette to micro waferer and vice versa. It also allows a second wafer drive to be connected. The retail price is £79.95.

Audiogenic also told of plans for a Bass Compiler package including two compilers, an assembler and a debugging monitor. At £49.95, Bass comes on disk and generates fully accessible code that is annotated with 6502 mnemonics.

And finally, there's the newest "intelligent interface" this time called Technofor. It's designed to make any parallel dot-matrix printer think it's a Commodore. Furthermore, it is designed to connect a parallel printer to a 64, VIC 20 or C16 — a marvellous range of options for a two-computer household or someone who wants the potential to upgrade.

A stand-alone version is more general and connects between the Commodore serial bus and the other to the printer's Centronics input socket.

Contact: Audiogenic Ltd, 39 Suttons Industrial Park, London Road, Reading, Berks RG6 1AZ. Tel: 0734-664646.

Covering the bases

Argus Press Software left no stone unturned at the LET show with software for virtually every end of the home computer market.

Starting with games, it showed its newly-released Give My Regards To Broad Street. Based on the film by 20th Century Fox and with Paul McCartney's music accompanying, the computer game sells for £7.99 on cassette for the 64.

It is well worth it. It's in graphic adventure format with a full scrolling road map. It concerns the goings on of seven characters who help the player find the missing chords of a new single — "No More Lonely Nights." If they're all found, McCartney plays for you. If not, try again.

Activity Centre was launched as a "professional, musical word processor and animator." At £14.95, it lets you write and illustrate text, paint and animate pictures, compose music and draw maps and graphs among a host of other things.

On the business side, Argus introduced Triangle, an integrated word processor, database and spreadsheet package. Written in 100 percent machine code, Triangle has all the standard features of writing, editing, storing, inventorying, etc. For the 64, it's £19.95.

At the educational end there's Clever Clogs, a line of early learning games. The 64 selection includes Party Time (ages three and over). As the name suggests, young players can blow out candles on a cake, sing along with nursery rhymes and draw on the screen.

Each of the Clever Clogs programs are £4.99 on cassette.

Contact: Argus Press Software, Liberty house, 222 Regent Street, London W1R 7DB. Tel: 01-439 0666.

Alive and well

The intimate workings of the human body from pounding heart to squirming corpuscles are the subject of an unusual new computer program called The Living Body.

It is based on the book by Karl Sabbagh who worked in consultation with Dr Cristiaan Barnard, the famous surgeon who performed the world's first transplant of a human heart. Channel 4 subsequently built a television programme around the book.

The subject is as the title says, The Living Body, and includes six computer programs with headings like "Getting to know your insides" and "So you think

Selling on the 64 for £12.95 cassette or £24.95 on disk, the package includes a 32-page colour booklet.

Contact: Software Communications Ltd, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE. Tel: 0323-768456.

Leonardo's namesake

With an ambitious name like Leonardo, the new graphics package from Creative Sparks will have a lot to live up to.

The package has been in the wings for some time but the company has delayed release in order to add some new ideas that popped up at the last minute. Product manager Gordon Reid says: "This product just kept on getting bigger and better throughout the final stages of development. So we felt it best to hold back release until all the new ideas had been incorporated."

The extra time resulted in an additional 18 functions including co-ordinate display system and grids. Further improvements were made to speed some functions.

The end product has three drawing styles with five separate drawing modes. Extra brushes were added so that the thickness of lines could be varied and every package function is available whether the drawing mode is free-hand, line drawing or programmed drawing. The software incorporates a user program to allow use of any graphics created within a basic or machine code program.

At a price of £9.95, Leonardo is designed for the average doodler as well as programmers, artists and draughtsmen. The package includes a manual with tutorials and reference section.

Contact: Thorn EMI Computer Software, Thomson House, 296 Farnborough Road, Farnborough, Hants GU14 7NF. Tel: 0252 543333.

Connexion

A new cassette based program and printer cable combination connects the 64 to any centronics printer.

The package gives two modes of operation, one providing carriage control facilities for program listings and word processing and the other allowing characters to be printed directly. The program does not interfere with user memory so it can be transferred onto disk if desired.

Called Commodore Connexion, the package uses a BICC Vero interface cable and sells for £19.95.

Contact: SMC Supplies, 11 Western Parade, Gt North Road, Barnet, Herts. EN5 1AD.

Keeping the print clean

Memorex, who came up with the Computer Care Kit, has developed a cleaning kit to take care of your printer.

Developed specifically for computers used in the home or small businesses, the Printer Care Kit will be sold in major retailers and independent shops. It contains a Foamclean anti-static aerosol cleanser for lifting ingrained dirt; a Safeclean aerosol solvent for cleaning print heads; a Printwheel cleaning brush; 10 non-woven Safecloths; and 20 lint-free Safebuds for getting into small places and awkward corners.

Accompanied with complete instructions, the kit costs £8.95.

Contact: Memorex UK Ltd, Memorex House, 96-104 Church Street, Staines, Middlesex TW18 4XU. Tel: 0784-51488.

Forth for the 64

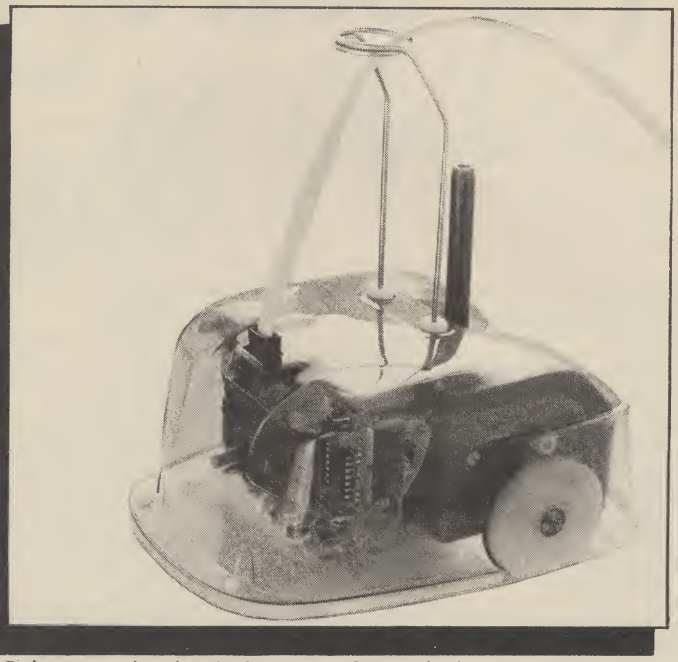
Melbourne House has launched its version of the high-level, high speed language Forth for the Commodore 64.

Written by John Jones-Steele, it allows the user to run programs from 10 to 50 times faster than those written in Basic. Commodore 64 Forth also can be tailored to a programmer's needs more so than some languages that don't allow specially designed function.

The package sells for £14.95 on cassette.

Contact: Melbourne House Publishers, Castle Yard House, Castle Yard, Richmond TW10 6TF. Tel: 01-940 6064.

Tiny robot



Robots needn't be frightening monsters that take over your house or office.

In fact, a company appropriately called InterGalactic Robots — the Droidsmiths — have produced a deceptively meek-looking creature housed in a small plastic box that fits quite neatly on a table top. But don't let first glances fool you. Zero 2, as it is called, is touted as the "first true robot for under £100, although the price gets quite close to that if you want the robot assembled.

The turtle-like robot comes with Logo software for an extra £30. It runs on wheels and features a pen, lights, line follower and a two tone horn that is controlled by electronic signals through a cable from the computer, in this case a C64. Zer 2 is 180mm long, 150mm wide and 90mm high with a transparent shell and baseplate so that the user can view partly completed patterns.

The turtle can be instructed through written programs to draw a trail of shapes since it moves to accuracies of 1.0mm or one degree. Attachments include a bumb sensor and an on-board expansion connector that allows up to two other printed circuit boards to be plugged in. This eventually would allow capabilities like speech synthesis and an infrared link to replace the physical connection to the computer.

IGR plans to be producing 2,000 units per month by June 1985.

Contact: IGR, Unit 208, Highbury Workshop, 22 Highbury Grove, London N5. Tel: 01-359 2536.

Price cuts on VIC software

The word processor Totl. Text.2.0 is now nearly half the original price after a cut by Atlantic Software.

Available in either cassette or disk from at £7 incl. postage and packing, the program provides facilities for the VIC with 8K expansion and any printer ranging from Commodore's own to others such as the Epson with suitable parallel or RS232 interfaces.

In formatting, Totl.Text.2.0 gives the user control over line width, page length, margins, tabulation, justification and spacing. A single mode takes care of text input, editing and insertion with full cursor control and scrolling.

Contact: Atlantic Software, 28 Park Farm Road, Kingston, Surrey KT2 5TQ.

Turtle makes its splash

A remote controlled Turtle that runs on the easy-to-learn Logo language is designed to be one of the first tools to teach young children the abstract concepts of computer programming and mathematics.

Designed by London-based Valiant Designs in the shape of a turtle (to help indicate to youngsters which way it is facing), the internal mechanisms are housed on a clear green, geodesic shell. That rests on a base fitted with wheels that move in units of one millimeter, one inch or one meter. An infra-red transmitter plugs into a port on the computer and sends command signals that the Turtle's logic turns into the proper moves, turns and pen actions.

Logo, created at Massachusetts Institute of Technology, actually was used with the first turtle designed by a team of two at Edinburgh University and made commercially by Jessop Microelectronics. The disadvantage was that the turtle requires a cord to attach to the computer. The Valiant Turtle runs on batteries through the transmitter.

Compatible with the 64, the package consists of the Turtle, batteries, communicator, pen, power adaptor, manuals and graphics software, all at a price of £204.95 (£199.95 plus £5 postage). One of the two manuals is a technical description of how to set up and connect the Turtle and the other describes functions and uses for it with separate sections for teachers, parents and children.

Contact: Valiant Designs Ltd, Park House, 140 Battersea Park Road, London SW11 4NB. Tel: 01-720 3947.

64-Epson interface

A German company has developed a 64-Epson printer interface board that produces the original Commodore character set with all graphics in up to 40 sizes.

Gorlitz Computerbau claims the interface, type 8422, allows users to get precise hard copy from the popular Simon's Basic program and includes a switch for changing the device address to conform to specific software such as word processors if necessary. The interface contains a 2K buffer with an 8K option and can be switched off if the centronics port is being used.

At a price of £68.50, the 8422 includes the DIN cable and a manual. Another interface, to be connected externally, is the type 8423 64-Centronics Interface which retails for £69.50.

Contact: Gorlitz Computerbau, PO Box 852, D-5400 Koblenz, West Germany.

BBC based education

Two BBC- originated educational programs are now on the C64, a vocabulary based French tutorial and Note Invaders.

Eiffel Tower is a language teaching program aimed at students, tourists and businessmen with a focus on conversation rather than learning grammar. The user must give correct answers to build the Eiffel Tower. The program is designed for users ages nine to adult.

Note Invaders, which also is available on the VIC 20, teaches note recognition on the bass and treble clefts in the tradition of the BBC program. The computer program features an invaders-type game to help with the learning. Written by a professional musician and music teacher, Derek Riddell of Portsmouth, Note Invaders uses high-resolution animation and is aimed at ages seven to adult.

Both programs retail for £7.95 cassette, £10.95 disk. Note Invaders for the VIC 20 is £9.25 cassette.

Another package coming up from Chalksoft is Rhythm And Pitch, a program to teach those two concepts and also is written by Derek Riddell. The company also hopes to bring Note Invaders to the C16.

Contact: Chalksoft Ltd, 37 Willowslea Road, Worcester WR3 7QP. Tel: 0775 69518.

Interactive study aids

Hill MacGibbon and Pan Books have joined forces to create six new comprehensive learning and revision aids designed to take the O-level student step-by-step through that agonising process of revising for exams.

Now available for the C64, the titles at the moment are physics, French, maths, chemistry and biology. An economics program is upcoming.

The study guide packages, called Pan Course Tutors, come complete with software, textbook and test papers for comprehensive, integrated study sessions tailored to the student's level.

The first step in this new revision method is the diagnostic test to determine the level the pupil is working and pinpoint particularly weak areas. This is done using questions on test papers with the student actually entering answers into the computer. A suggested time limit is given and the progrtam considers time taken with each answer as well as with the entire test when evaluating the results.

When testing is finished, the computer displays the answer to each question, shows the marks scored compared to the possible marks and then gives a summarised report of the subject's performance with pointers to where more work is needed.

That leads to the learning moudles that use a sort of problem-solving technique to teach. Most example-problems are illustrated with graphics if at all possible and a wrong answer is prompted with at least one hint before actually giving the answer. If the student wants to try again after that, the program presents a similar question with slight changes. This latter function encourages learning concepts instead of rote memorization of answers.

The packages can also be used to some extent in the classroom as demonstration tools. The authors all are O-level examiners and experts in their respective fields. Each package retails for £14.95 incl VAT.

Contact: Hill MacGibbon Ltd, St Bartholomew House, 92 Fleet Street, London EC4Y 1BH. Tel: 01-353 6482.

Pascal 64

Extensions for graphics, sound and joystick control are among the extras in Pascal 64, new for the 64 from Orpheus Ltd.

The package is based on standard Pascal with compiler, run time interpreter and an extended version of the Commodore screen editor. Orpheus runs a free technical update service for its customers including amendments and corrections to the manual and applications notes.

Stand alone machine code and a Pascal demo tape for novices are also in the wings as future additions to Pascal 64. Meanwhile, a 128 page manual that accompanies the package includes examples of the working of each command.

Retail price is £24.95 incl VAT.

Contact: Orpheus Ltd, Unit 1, Church Farm, Hatley St George, Nr Sandy, Beds. Tel: 0767-51481.

Conservation on computer

A games program nominated for the Computer Trades Association Educational Program of the Year award is now available for Commodore 64 users.

Produced by Bourne Educational Software Ltd of Hampshire, Osprey was developed in conjunction with the RSPB (Royal Society for the Protection of Birds). The 3D graphics game is intended to teach users about wildlife conservation by forcing decisions such as how many wardens are needed and where to control visitors at the RSPB's site at Loch Garten in Scotland.

Price is £9.95 cassette and £11.95 disk.

Contact: Bourne Educational Software Ltd, Bourne House, The Hundred, Romsey, Hampshire SO5 8BY. Tel: 0794-523301.

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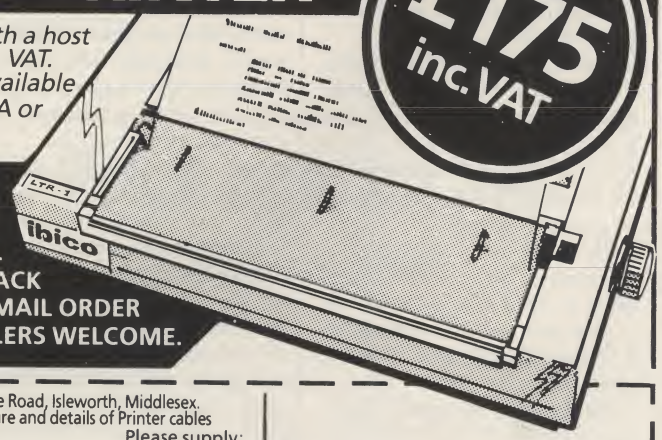

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Adding Function Keys — a mini-project

If you own a PET, have you ever envied the function keys on other computers? David Hornsby tells you how to remedy this situation. The user port of any PET may have eight switches simply wired to it. Add the software given here and your computer will now possess eight function keys.

There are two parts to this project, the hardware and the software. Both are quite straightforward and any PET is suitable for this upgrade. Eight small push button switches must be wired to the user port. Figure 1 gives the details.

I prefer not to solder connections onto the computer's main printed circuit board so recommend that you use an edge connector. Virtually any 'push to make' type of switch can be used since the software removes all switch bounce. Try to get a size which will fit snugly between the main body of the computer and the VDU. Then you may mount the switches in a row immediately under the screen as shown in Figure 2. This saves having to drill holes round the keyboard.

The assembly listing has sufficient comments to explain its workings to those interested. The program has been placed at address $7000 but may be re-assembled at any convenient address or even programmed into EPROM. If you use $7000, remember to lower the top of memory with:

POKE53,112: POKE52,0: CLR

I have chosen the following eight functions for implementation:

KEY	FUNCTION PERFORMED
0	DIRECTORY DRIVE 0
1	DIRECTORY DRIVE 1
2	SYS36864 (activate an EPROM in the $9000 socket)
3	SYS40960 (activate an EPROM in the $A000 socket)
4	SYS54386 (enter the machine code monitor)
5	LIST A PROGRAM IN MEMORY TO THE PRINTER
6	LIST DIRECTORIES TO PRINTER
7	UNLISTEN PRINTER (use after using 5 or 6)

However, you are free to alter any of these to your own choice. All that needs doing is to change the appropriate entry in the table of bytes at the end of the assembly listing. The first byte of an entry is a number which indicates the number of bytes that follow in that command. The command in ASCII follows, with command abbreviation being acceptable (eg diR for DIRECTORY).

The program is inserted into the interrupt routine with the command SYS28672. It may be disabled with SYS28678. Switch debouncing in software can consume appreciable processor time. The program has been constructed to minimise the

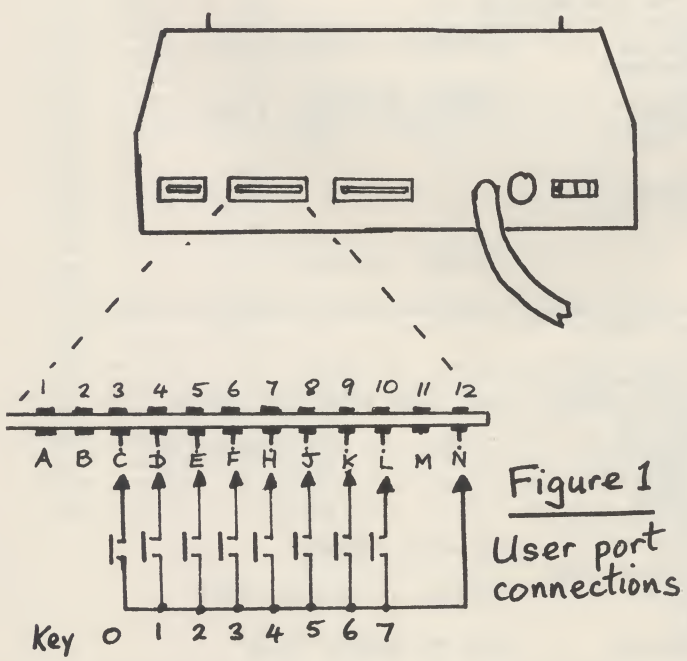


Figure 1
User port connections

effect of this on the interrupt routine by performing it only when one of the function keys is seen to have switched on or off. As soon as a function key is pressed, the program picks out a value from the INDEX table. This points to the appropriate command in the COMMAND TABLE which is placed in the keyboard buffer. The effect is as if the command followed by a 'RETURN' had been entered from the keyboard but at lightning speed! That's about all there is to it.

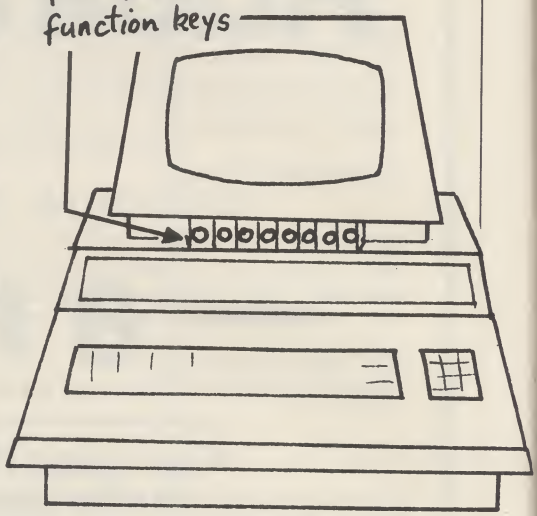
For the enthusiast with an EPROM programmer further refinements are possible and certainly worthwhile. Firstly, place the program in EPROM so it is always available. Better still, have the routine permanently activated by substituting the $E000 ROM with a 2K EPROM with modified code. Disassemble the interrupt routine and patch a JMP instruction to the START of the function keys program. Do this at the *end* of the IRQ sequence just before the code PLA, TAY, PLA, TAX, PLA, RTI. Then change the JMP instruction at EXIT in the function keys code to jump back to the appropriate part of the $E000 ROM and the function keys will always be active.

BASIC 4 has ample space for this change. BASIC 2 hasn't so a little of the code in the $E000 ROM will have to be added to the function keys code. The INSERT/REMOVE routine at the start of the program becomes redundant and should, of course, be omitted.

For those without a PROM programmer, since the INDEX and COMMAND TABLES are located in RAM, the function keys are alterable by poking new commands into this area. If you place the program in ROM, the TABLES will have to be located in spare RAM, perhaps one of the cassette tape buffers. The function keys then become "soft keys," that is keys whose function may change during the operation of a program to suit the needs of that program. If the keys are mounted under the VDU, the screen could even display the current function of each key on the bottom line, just like certain other rather expensive brands of computer.

Figure 2

a good place for the function keys



```
7000 ******     1 *         =$7000
7000 ******     2 !*************************
7000 ******     3 !* FUNCTION KEYS PROGRAM *
7000 ******     4 !*************************
7000 ******     5 !AUTHOR D.D.HORNSBY, 21 FEB 1985
7000 ******     6 !THIS PROGRAM IMPLEMENTS 8 FUNCTION KEYS WHICH ARE
7000 ******     7 !PROVIDED BY SWITCHES CONNECTED BETWEEN THE USER PORT
7000 ******     8 !AND GROUND. THE SWITCHES ARE DEBOUNCED IN SOFTWARE
7000 ******     9 !AND EXAMINED BY A ROUTINE SLOTTED INTO THE NORMAL
7000 ******    10 !IRQ ROUTINE OF THE PET/CBM.
7000 ******    11
E84F ******    12 USERPORT =$E84F
E843 ******    13 CONTROLPORT =$E843
026F ******    14 KEYBUFF   =623                !KEYBOARD BUFFER (527 BASIC1)
009E ******    15 KEYNUM    =158                !NO OF CHRS IN KEYBUFF (525 BASIC1)
E455 ******    16 IRQ       =$E455              !($E685/E62E FOR BASIC1/2)
0090 ******    17 IRQVEC    =$90                !($0219 FOR BASIC1)
000D ******    18 RETURN    =13                 !ASCII CODE
000F ******    19 NRFLAG    =15                 !NO REPEAT FLAG (6 FOR BASIC1)
0010 ******    20 STORE     =NRFLAG+1           !A TEMPORARY STORE
7000 ******    21
7000 ******    22 !INSERT/REMOVE THE IRQ ROUTINE
7000 ******    23 !---------------------------
7000 A911      24           LDA #<START         !SYS28672 -TURN IT ON
7002 A270      25           LDX #>START
7004 D004      26           BNE SET             !FORCED BRANCH
7006 A955      27           LDA #<IRQ           !SYS28678 -TURN IT OFF
7008 A2E4      28           LDX #>IRQ
700A 78        29 SET       SEI
700B 8590      30           STA IRQVEC
700D 8691      31           STX IRQVEC+1
700F 58        32           CLI
7010 60        33           RTS                 !RETURN TO BASIC
7011 ******    34
7011 ******    35 !=====================================================
7011 ******    36 !THE IRQ ROUTINE ITSELF
7011 ******    37 !----------------------
7011 A900      38 START     LDA #%00000000
7013 8D43E8    39           STA CONTROLPORT     !SET USER PORT FOR INPUT
7016 A50F      40           LDA NRFLAG
7018 D01E      41           BNE NOREPEAT        !TO PREVENT KEY REPEATING
701A AD4FE8    42           LDA USERPORT
701D 8510      43           STA STORE
701F C9FF      44           CMP #%11111111
7021 F05B      45           BEQ EXIT            !NO KEYS PRESSED
7023 204C70    46           JSR CHECKBOUNCE
7026 9056      47           BCC EXIT            !BRANCH IF BOUNCE SEEN
7028 A901      48           LDA #1
702A 850F      49           STA NRFLAG          !SET NO REPEAT FLAG
```

```
702C A510      50            LDA STORE          !FUNCTION KEY VALUE
702E 49FF      51            EOR #%11111111     !CONVERT TO POSITIVE LOGIC
7030 A207      52            LDX #7             !8 FUNCTION KEYS, 0 TO 7
7032 0A        53 LOOP1      ASL A              !FIND KEY POSITION
7033 B027      54            BCS FOUND
7035 CA        55            DEX
7036 90FA      56            BCC LOOP1
7038 ******    57
7038 AD4FE8    58 NOREPEAT   LDA USERPORT
703B 8510      59            STA STORE
703D C9FF      60            CMP #%11111111
703F D03D      61            BNE EXIT           !BRANCH IF KEY STILL PRESSED
7041 204C70    62            JSR CHECKBOUNCE
7044 9038      63            BCC EXIT           !BRANCH IF BOUNCE SEEN
7046 A900      64            LDA #0
7048 850F      65            STA NRFLAG         !CLEAR NO REPEAT FLAG
704A F032      66            BEQ EXIT           !FORCED BRANCH
704C ******    67
704C 38        68 CHECKBOUNCE  SEC              !CARRY=1: ASSUME NO BOUNCE FOR NOW
704D A2FA      69            LDX #250           !CHECK 250 TIMES FOR BOUNCE
704F AD4FE8    70 CHECK1     LDA USERPORT
7052 C510      71            CMP STORE
7054 D004      72            BNE CHECK2         !BOUNCE SEEN
7056 CA        73            DEX
7057 D0F6      74            BNE CHECK1
7059 60        75            RTS                !RETURN WITH CARRY=1
705A 18        76 CHECK2     CLC                !CARRY=0: BOUNCE FLAGGED
705B 60        77 CHECK3     RTS                !RETURN WITH CARRY=0
705C ******    78
705C ******    79 !THE VALUE IN X NOW CORRESPONDS TO THE FUNCTION KEY PRESSED
705C BD8170    80 FOUND      LDA INDEX,X        !THE OFFSET FROM THE INDEX TABLE
705F AA        81            TAX                !AND PLACE IT IN X
7060 18        82            CLC
7061 7D8970    83            ADC TABLE,X        !ADD INDEX TO BYTE TOTAL
7064 A8        84            TAY
7065 BD8970    85            LDA TABLE,X        !PLACE BYTE TOTAL IN X
7068 AA        86            TAX                !X IS LOOP COUNTER
7069 48        87            PHA                !SAVE BYTE TOTAL
706A A90D      88            LDA #RETURN
706C 9D6F02    89            STA KEYBUFF,X      !PUT 'RETURN' AT END OF BUFFER
706F B98970    90 LOOP2      LDA TABLE,Y        !MOVE THE COMMAND FROM THE TABLE
7072 9D6E02    91            STA KEYBUFF-1,X    !INTO THE KEYBOARD BUFFER
7075 88        92            DEY
7076 CA        93            DEX
7077 D0F6      94            BNE LOOP2          !LOOP IF MORE BYTES TO MOVE
7079 68        95            PLA                !PLACE BYTE TOTAL IN KEYNUM
707A 859E      96            STA KEYNUM
707C E69E      97            INC KEYNUM         !ADD A BYTE TO INCLUDE 'RETURN'
707E 4C55E4    98 EXIT       JMP IRQ            !CONTINUE WITH NORMAL INTERRUPT
7081 ******    99
7081 ******   100 !TABLE OF INDEX VALUES WHICH GIVE THE OFFSET OF
7081 ******   101 !EACH COMMAND IN THE TABLE OF COMMANDS BELOW.
7081 00       102 INDEX       .BYT DIR0-DIR0
7082 06       103             .BYT DIR1-DIR0
7083 0C       104             .BYT SYS1-DIR0
7084 14       105             .BYT SYS2-DIR0
7085 1C       106             .BYT MONITOR-DIR0
7086 24       107             .BYT PRINTP-DIR0
7087 31       108             .BYT PRINTD-DIR0
7088 3F       109             .BYT CLOSEP-DIR0
7089 ******   110
7089 ******   111 !TABLE OF COMMANDS FOR FUNCTION KEYS
7089 ******   112 !FIRST BYTE IN EACH CASE IS THE COMMAND LENGTH
7089 054449   113 DIR0        .BYT 5,68,73,210,68,48 !DIRECTORY0
708F 054449   114 DIR1        .BYT 5,68,73,210,68,49 !DIRECTORY1
7095 0753D9   115 SYS1        .BYT 7,83,217,"36864" !SYS36864
709D 0753D9   116 SYS2        .BYT 7,83,217,"40960" !SYS40960
70A5 0753D9   117 MONITOR     .BYT 7,83,217,"54386" !SYS54386(BASIC2:64785)
```

```
70AD 0C4FD0   118 PRINTP     .BYT 12,79,208,52,44,52,58,67,205,52 !OPEN4,4:CMD4
70B7 3A4CC9   119            .BYT 58,76,201    !:LIST
70BA 0D4FD0   120 PRINTD     .BYT 13,79,208,52,44,52,58,67,205,52 !OPEN4,4:CMD4
70C4 3A4449   121            .BYT 58,68,73,210 !DIRECTORY
70C8 0850D2   122 CLOSEP     .BYT 8,80,210,52,58,67,76,207,52 !PRINT#4:CLOSE4
7089 ******   123 TABLE     =DIRO
70D1 ******   124            .END
```

HEX DUMP FOR 40/80 BASIC 4 MACHINES

```
.: 7000 A9 11 A2 70 D0 04 A9 55    .: 7070 89 70 9D 6E 02 88 CA D0
.: 7008 A2 E4 78 85 90 86 91 58    .: 7078 F6 68 85 9E E6 9E 4C 55
.: 7010 60 A9 00 8D 43 E8 A5 0F    .: 7080 E4 00 06 0C 14 1C 24 31
.: 7018 D0 1E AD 4F E8 85 10 C9    .: 7088 3F 05 44 49 D2 44 30 05
.: 7020 FF F0 5B 20 4C 70 90 56    .: 7090 44 49 D2 44 31 07 53 D9
.: 7028 A9 01 85 0F A5 10 49 FF    .: 7098 33 36 38 36 34 07 53 D9
.: 7030 A2 07 0A B0 27 CA 90 FA    .: 70A0 34 30 39 36 30 07 53 D9
.: 7038 AD 4F E8 85 10 C9 FF D0    .: 70A8 35 34 33 38 36 0C 4F D0
.: 7040 3D 20 4C 70 90 38 A9 00    .: 70B0 34 2C 34 3A 43 CD 34 3A
.: 7048 85 0F F0 32 38 A2 FA AD    .: 70B8 4C C9 0D 4F D0 34 2C 34
.: 7050 4F E8 C5 10 D0 04 CA D0    .: 70C0 3A 43 CD 34 3A 44 49 D2
.: 7058 F6 60 18 60 BD 81 70 AA    .: 70C8 08 50 D2 34 3A 43 4C CF
.: 7060 18 7D 89 70 A8 BD 89 70    .: 70D0 34 AA AA AA AA AA AA AA
.: 7068 AA 48 A9 0D 9D 6F 02 B9
```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The fast way to get your precious data safely tucked away is with Alpha 10. With Alpha 10's compact cartridges, data copying is as simple as with floppies and as fast as any Winchester. They are PORTABLE — and that means SAFETY!

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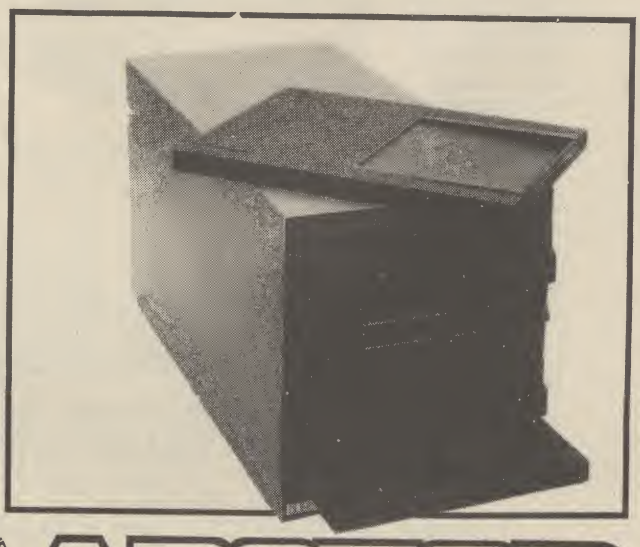
- Similar disk layout to the 9060/9090 units
- Supports the changing of the Commodore IEEE device number



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Custom PC keys

Caxton Software has come up with a disk-based program to customise and automise the keyboard functions of a PC-compatible machine, which would include the brand new Commodore PC. Called SmartKey, the program lets the user redefine any key so that he can produce words, paragraphs and sets of software commands with just a single keystroke.

At a nominal price of £99 ex VAT, SmartKey could make your frequently-used foreign or graphics characters and mathematical symbols much easier to use since a sequence of commands could be reduced to just one touch of a special key. Another use could be to redefine either of the sets of numeric keys for more useful purposes.

Since the Commodore PC is designed for true PC compatibility, Commodore PC owners should have no difficulty using the product.

Contact: Caxton Software Ltd, 10-14 Bedford Street, London WC2E 9HE. Tel: 01-379 6502.

Doctor 64

A personality analyzer and a biofeedpack package are among the unique and sophisticated software on offer from the American company, Psycom Software International.

Aimed primarily at the medical and psychological fields, The Hypnotist and The Personality Analyzer are complex packages designed for use by hypnotists, analysts and psychologists.

The Hypnotist, which requires a heart monitoring peripheral to work with it, was designed by the company's president, Patrick J. Williams, a professional hypnotic consultant. The program accepts information on the patient's pulse from the biofeedback device and displays a readout of the changes in the heart beat.

Among the uses Psycom boasts for The Hypnotist are deep relaxation and stress reduction for executives or for use by a psychologist experimenting with hypnotic techniques.

The Personality Analyzer, based on the psychology of Carl Jung, is more for private use and Psycom even suggests a Personality Party to get better acquainted and "find out who is really compatible." The 88-question survey is similar to those used by researchers such as Gray and Wheelwright, Myers and Briggs and Keirsey, Psycom says. The survey is used to determine thinking, feeling, sensing and intuiting in conjunctions with certain attitudes like introversion, extroversion, closure, judging and perceiving. The program then gives a personality read-out on screen that can also be printed out. Among the current users are a psychotherapist, a clergyman and a someone establishing a dating service.

The Hypnotist retails for US$87.95 on disk including the necessary heart rate monitor. The Personality Analyzer is US$27.95 on cassette and US$32.95 on disk. Psycom also produces a handwriting analyzer for US$32.95 disk and a Psych Experimenter for US$39.95. Foreign orders must be pre-paid and .50 added for each cassette or disk to cover freight costs.

Contact: Psycom Software International, 2118 Forest Lake Drive, Cincinnati, Ohio 45244, USA. Tel: 513-474-2188.

All in one

Word processor, spreadsheet, graphics facilities and a database are combined in a new business package from Database Software, an arm of Database Publications.

Called Mini Office, the software combo is now available on the C64 for just £5.95. The graphics portion features facilities for creating 3D-effect bar charts, pie charts and graphs.

The spreadsheet provides the standard column and row format, continuous updating with each update reflected immediately through the entire spreadsheet. The database features retrieve, replace, save, print and search.

Double-height text is one of the unique offerings on the word processor included in Mini Office. Whether on-screen or in the print-out, the writer has the option for text double the size in height in addition to normal sized text. Printing results, of course, will depend on the printer being used. The software also keeps a constant word count and time display.

Contact: Database Software, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Tel: 061-456 8383.

Payroll upgraded

Landsoft has combined the two disks of Payroll Plus 64 onto one and is sending the new version to all their users without charge.

The upgrade means only one disk is needed to operate the package instead of the two — one for programs and one for files. The two-disk version was inconvenient particularly for users with only a single disk drive who had to continuously switch disks from one to the other.

Landsoft also is supplying its current users with new programs to comply with recent changes in the Inland Revenue Specification that goes into effect 6 April. The company says merely changing parameters will not suffice and entirely new programs are necessary to conform to the change.

Contact: Landsoft Ltd, 28 Sheen Lane, London SW14 8LW. Tel: 01-878 7044/7.

Something for the little man

Business needn't always be big, and Audiogenic has developed an accounting package for the small business incorporating software to record sales, purchases and VAT. Priced at about £49.95, the package provides for all information necessary for an accountant to complete an audit.

Audiogenic also is working on a version of its Swift spreadsheet and Magpie database for the Commodore 128, a machine launched in January in the United States and expected to be brought to the UK this spring, though Commodore UK remains closed-mouthed about the prospects. Audiogenic says the 128 version of Swift will have extra features to take advantage of the new machine's larger memory.

The current 64 version of Swift is the object of a new experiment by Audiogenic. The company is offering a "test-drive" as they call it. Commodore 64 owners can write to Audiogenic enclosing a cheque or postal order for 50p and the company will send along a demonstration cassette of the spreadsheet program.

The demo is identical to the real program, Audiogenic says, except that the Load, Save and Print routines are removed. The working memory is restricted and documentation is only enough to let you try some examples and set up a spreadsheet of your own.

Micro Swift is available on cassette and disk and if you decide to buy the package after your demonstration, Audiogenic will knowk off the 50p from the price of the package, £19.95.

Contact: Audiogenic Ltd, PO Box 88, Reading, Berks. Tel: 0734 664646.

Orpheus uses own language

A high-speed machine code language for handling files is the key feature of a new C64 database from Orpheus Ltd.

Called E-File, the application language will be available soon as a separate package. Meanwhile, it forms the basis for the sentence command structure of Megabase that distinguishes the package from the more usual menu-driven databases. This structure allows the user to print or view a specific portion of the file or all of it at one time, a function called dumping. Each file can hold about 21,000 characters of text or numeric information.

Megabase retails for £24.95 incl VAT.

Contact: Orpheus Ltd, Unit 1, Church Farm, Hatley St George, Nr Sandy, Beds. Tel: 0767 51481.

VIZASTAR 64

THE INFORMATION PROCESSOR

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■ A 1000 Row by 64 Column wide worksheet with large memory capacity and efficient usage.
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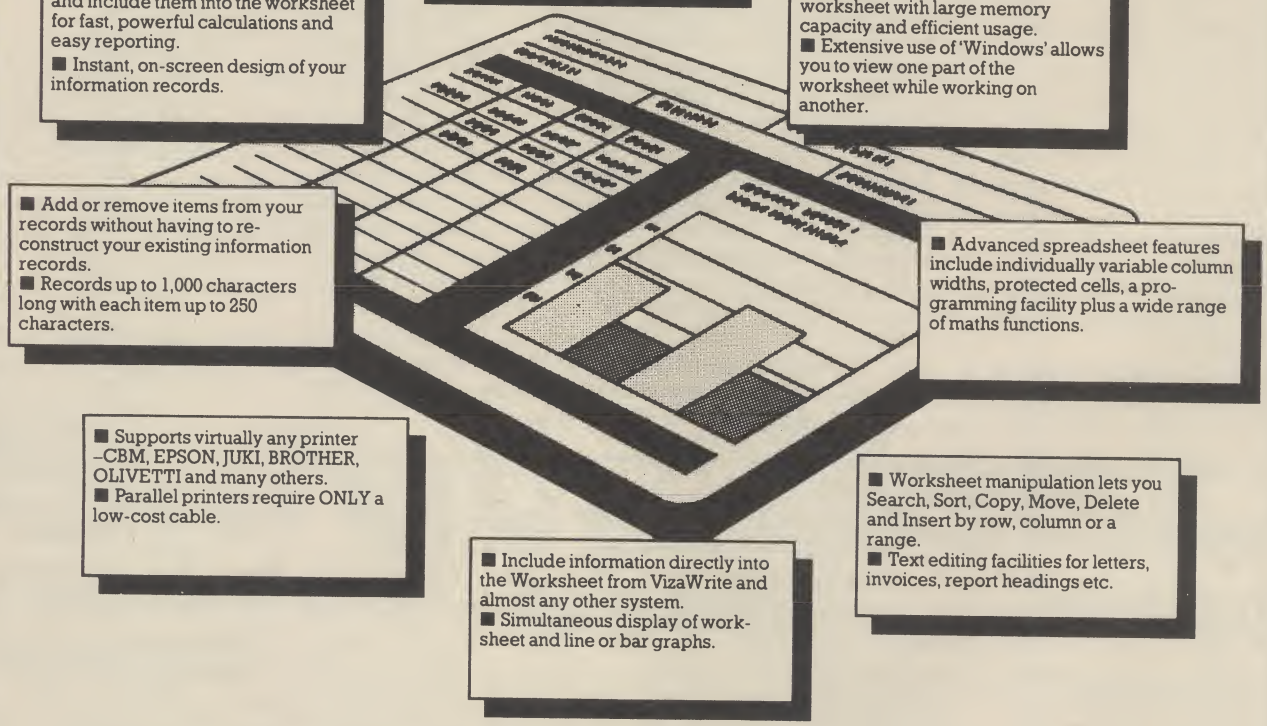

■ Add or remove items from your records without having to re-construct your existing information records.
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The last word on FirstWord

Viola Gienger takes a close look at one of the newest word processing packages available for the C64 and finds a few niceties along with some disturbing gaps

The implication of the title FirstWord is that, like the familiar Ericsson computer adverts, it holds your hand.

Indeed, that is a crucial point in word processing particularly for someone who is trying such an essential piece of software for the first time. Once you are used to a word processor, the typewriter — electric or not — seems archaic.

But "used to" is the key phrase here because unlike using a typewriter you can't simply sit down and begin typing on a word processor. Certainly the keyboard on a computer looks familiar, but that's where the likeness ends. The simple fact that you can do so much more with a word processing package than with a typewriter opens up a whole new can of worms.

"A good, basic word processor"

Unfortunately, First Publishing's package doesn't make that learning experience as easy as it could be, although the end result is a good, basic word processor with most of the necessary functions and a few more.

FirstWord is menu-driven to an even larger extent than most. Rather than switching to the correct mode and typing in the code for a request such as directory, file, print, etc, FirstWord uses a straightforward tree-like structure that lets you specify your choice from a selection of several and then narrows it further.

The function keys are used for different things depending on what mode you are in. Admirably, First Publishing decided to make good use of them in write mode for such frequently used commands as moving to the beginning of a document on the screen. Other function keys allow moving to the beginning of the next word or the beginning of the previous word.

All these are useful features once you are comfortable with FirstWord. It's just that getting to that point could be frustrating for the experienced computer buff or the beginner.

The major problem is the manual, that crucial documentation that makes the difference between finding your way around quickly and taking hours just to figure out how to pull a file from disk to screen. The instructions include a very brief table of contents but no index or comprehensive summary of functions. It seems to assume that the user will read the ring-bound book all the way through before touching the computer, a foolish thought that even school teachers abandoned long ago.

For example, the method of retrieving a file from disk to the screen is covered under the vague and ill-descriptive Contents heading "Reading a Document." Personally, I learned to read long ago so I didn't think that was my problem. Granted, I could have read further to find it, but even if I had I would have had to search closely to find it a second time.

"Useless cosmetic features"

The instructions begin with a tutorial section moving the user through steps from the most basic to advanced functions. Here you learn that you have an alternative character set or typeface to work with, a nice touch but there is one catch — you can only use it on screen and it doesn't actually reproduce when you print out. The same applies for a function that allows the user to define a special character set. Clearly these are useless cosmetic features that do nothing more than use up valuable memory.

Another step asks you to enter the date, but again there seems to be no reason for it in since it never appears anywhere on screen, much less on the printout, unless you give a multi-step command to "automatically" enter it at a particular place. This probably would be achieved more easily just by typing in the few numbers and letters of the date when and where you need them.

You can also choose colours of text, background and border. This is useful for adjusting to tints comfortable for your eyes under varying light conditions.

Lesson II of the tutorial begins by telling you FirstWord defaults to an 80 column screen unless you tell it otherwise. But it doesn't tell you how to tell it otherwise or where to find that information! In fact, the instruction appears toward the end of the manual under the heading "Screen Selection" — not exactly crystal clear. So until you find that section you must work with an 80-column screen that scrolls left to show the extra 40 characters on any one line. It's a disconcerting experience for someone who's never used anything but a typewriter where every word being typed is shown clearly on the paper.

The first document FirstWord teaches you to create is a letter in block form. This is where you discover that hitting the "Return" key is not enough to mark the end of a paragraph. Instead you must press "Shift" and "Return" using two fingers instead of one. The "Return" key alone only moves the cursor to the beginning of the next line.

"Very convenient"

To adjust the format of a letter or document you've created you must first create a "format template" or a file that gives specifications such as page length, margins, pause for single sheet printing and line spacing. Once the template is completed it can be stored on disk and called up each time. This is very convenient since you won't have to re-enter format specifications each time you create a similar document for printing. You simply load the template first, then load or create the document and you're off. Format files are listed in the

same directory as text files although they are accessed differently, which could cause a bit of confusion at first.

If you don't need a complete template or want to make format adjustments in just a brief portion of the document, FirstWord lets you do that through "control characters."

FirstWord provides an interesting function to do calculations within a text using what it calls an "internal algebraic register." Addition, subtraction, multiplication and division can all be done with up to nine digits of accuracy. The method is rather complex, though, so I would recommend using it only for calculations you can't do in your head or on paper.

"All the necessary functions"

FirstWord also has the more standard operations of indenting paragraphs, insertion, deletion, moving blocks and search-replace. In terms of compatible printers, FirstWord, which was written in West Germany, is best used with the standard Commodore 1525 or 1526. With an Epson you'll need an interface that allows the printer to emulate a Commodore. Otherwise you'll have to go through the teeth-grinding frustration of changing all the ASCII codes, device and secondary addresses, etc.

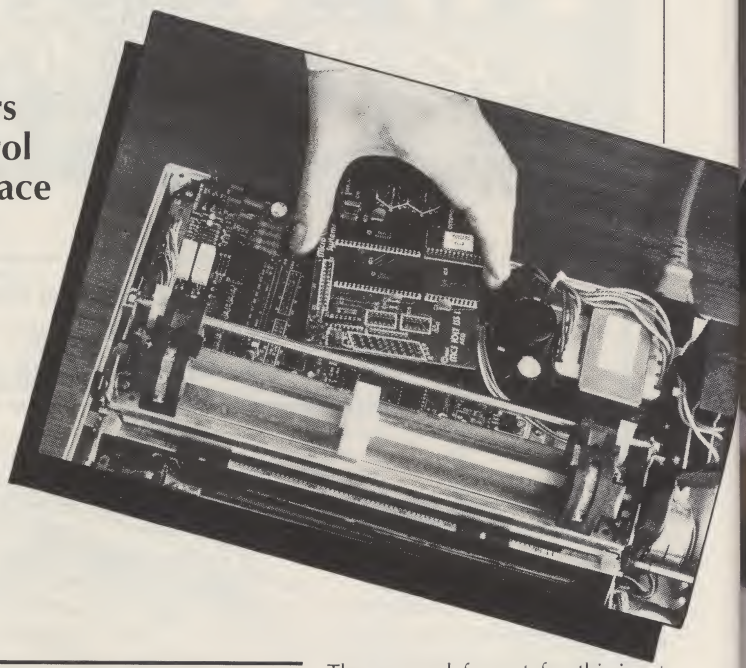
This limitation must be taken into great consideration by the person about to buy a word processor. We tried using a rather old Commodore 3022 Tractor Printer with no success. Finally we were able to print out on an Epson FX80 fitted with a Turbo Print interface manufactured in the US.

Generally speaking, FirstWord has all the necessary functions of a standard word processor and the set up is easy to use once you've figured out how it all works. In convenience and for a price of £35.99, FirstWord leaves much to be desired in terms of the software and the instructions manual. Too bad the manual doesn't have an automatic "Search" function.

Contact: First Publishing Ltd, Unit 20B, Horseshoe Road, Horseshoe Park, Pangbourne, Berks. Tel: 07357 5244.

Only connect

Bill Donald discovers whether Micro Control Systems' printer interface is making the right connections.



The COMPRINT is another recent addition to the burgeoning printer interface scene for the Commodore 64. It is one of the few British made products in this field and is rather different from the usual multi-printer type interfaces we are used to seeing.

The COMPRINT is specifically made for interfacing the Commodore 64 to EPSON-X series printers and clones such as the SHINWA CP80. This could be regarded as limiting the user's choice, however, EPSON are the market leaders in dot matrix printers. Admittedly EPSON are also amongst the leaders in price too, but like most things in life it is a matter of getting what you pay for. I have to admit here to being somewhat biased since I run a RX80 F/T, but I am always amazed at the range of user control with this machine.

The interface is supplied in the shape of an open printed circuit board and a generous length of cable for connecting the board to the serial socket of the Commodore 64 or 1541 disk drive. Care is needed in handling any printed circuit board and the COMPRINT is no exception to this, although visual examination showed no loose components or poor standard of construction. At this point those of you who are not confident or familiar with, the handling and installing of printed circuit board's will probably start chewing fingernails and look to their friendly retailer to install the interface for them. Yes, this device has to be installed INSIDE the printer.

"A clean, professional looking job"

Installation is not difficult and results in a very clean, professional looking job — unless of course, you like cables and other miscellania leaving you no room to park the coffee cup!! The instruction manual does make an effort to cover the installation. Unfortunately, it is not quite accurate in the description of the components inside the EPSON used to orientate the board. You cannot blame the COMPRINT's manufacturers for this, there are several versions of the printed circuit board in the EPSON despite no external differences between the same type of printer. A similar situation applies to the 1541 disk drive when you are looking for the device number jumpers, the printed circuit board of the Japanese built drives is different from the German built models, so the position of the jumpers varies, (the instant giveaway to country of origin in this instance is the shape of the heatsinks).

Once the interface is installed it is time to look to manual once more regarding operation. The COMPRINT relies on using the SECONDARY addressing technique.

The general format for this is:

```
OPEN
  <FILE NUMBER>
  (^range 0-255)
  <DEVICE NUMBER>
  (^usually 4)
  <SECONDARY ADDRESS>
  (^range 0-13)
```

an example of direct mode, disk directory printer listing would be:

```
LOAD "$",8
OPEN 1,4,0
CMD 1
LIST
PRINT#1
CLOSE1
```

A total of ten files can be open at any given time so there is little restriction on accessability. A useful addition to the series of secondary addresses is an error reader from the printer. This will list any naughty format or command instructions that the printer cannot accept. It is a good practice to immediately open up on this channel and leave it open until you have finished with the printer. It is, in some respects, equivalent to the disk drive channel 15.

"Little restriction on accessability"

There are a number of program listings (in BASIC) for demonstrating the various modes of operation. Machine

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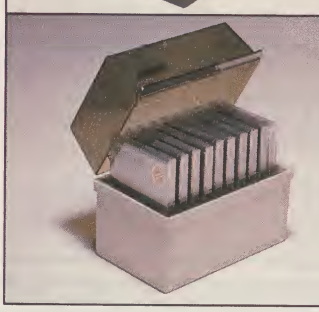

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Code appears to be totally ignored, quite possibly for reasons of security over the manufacturer's ROM. However, it would be useful to advanced programmers, there are many of us who don't use BASIC.

Using the COMPRINT with commercial software was rather like the curate's egg, viz., good in parts. When Basic programs were involved there was little problem. It was obviously necessary to set up the printer in the required type-style before use. However, using EASYSCRIPT revealed severe problems of control. The printer simply refused to stop printing when commanded, control could only be restored by switching the printer off-line. Trying different definitions of printers was not successful. If this is a flaw in this interface, and not an isolated example then the marketability of the COMPRINT must be suspect. Whilst EASYSCRIPT may not, arguably, be the best word processor for the Commodore 64, it must at least numerically be the most popular package bearing in mind Commodore's sales campaign last year bundling it with the 1541 disk drive.

The COMPRINT has a 2K buffer onboard and this does help in the print speed by "emptying" the Commodore 64 memory quicker. The makers of the interface also supply various sizes of printer buffers, but no mention of this useful fact is made in the manual. Details of these buffers would, I feel, stimulate sales of the interface.

"Undeniably an interface to look at"

The manual is a great let down and does not do justice to the COMPRINT. Interfaces of any description are a tricky area and to sell us a badly layed out, poorly documented offering such as this is not acceptable. Even more inexcusable, in my eyes, is the fact that most of the major failings in terms of the manual could be overcome by judicious use of the device the manual is attempting to explain!

The COMPRINT is undeniably an interface to look at if you own or intend purchasing an EPSON or EPSON clone printer. It does support the unique Commodore graphic symbols in addition to the very useful graphics symbol translation mode. Make sure you see a demonstration first, or request that the supplier allows a run on your own system, after all you wouldn't buy a car if it were under a sheet would you?

Contact: Micro Control Systems, 1 Cherrywood Drive, Aspley, Nottingham. Tel: 0773 769011.

Bill Donald

Keep it on FILE

Bob Davis finds P&P's disk-based database to be a powerful and versatile program.

Disk-based PFS:FILE is an American product from Software Publishing Corporation for the Commodore 64. Under the category of "Database," PFS:FILE (just FILE from now on) is an information storage and retrieval system, and a very good one at that.

The essential part of a good Database has to be its versatility and FILE certainly lives up to that. There are no restrictions on each field's size or length as you 'design' your own file creating as many fields as you wish. As each 'form' is entered it is stored directly to disk, thereby eliminating any possibility of data losses. Provided you have not filled more than 50% of the disk, you can change the design of the file and still maintain all current information. The quantity of forms to each file created is limited to the disk's capacity. An average file containing 10 fields with about 12 characters per field will allow around 500 forms per disk.

The package comes in an attractive 'sleeved' box, containing a single disk and manual. Surprisingly, the review disk had no 'write protect' tab fitted. Measuring 8 × 6 inches the manual is of high quality, ring bound and around 40 pages thick. Providing a simple but comprehensive guide (including screen displays) it takes you through all the stages of designing a form and using FILE. A handy quick reference guide is provided and a section explaining the disk storage capacity was useful.

Loading the program took about two minutes and also took about two days off my drive unit head's life. (I do wish someone would design a safer method of disk protection!) On start up you are presented with a six option menu. Beware! Selecting 6 for EXIT and pressing return does just that, without any secondary warning, so pressing it by mistake will leave you staring at the reset screen!

"Designing a file is simplicity itself"

Designing a file is simplicity itself, where you just type in the field titles in any format or size you wish. Editing is easy with the insert, erase and delete facilities. If the current screen is not large enough then you go on to the next screen and so on. When you are complete, pressing F7 will save that file to disk and then you go on to filling each form with your data. Pressing the run/stop key at any time will return you to the main menu but if you haven't saved that file then I'm afraid you've lost it. As each form is completed, F7 saves it to disk. The best part about this is, if you find the current form is not big enough for any specific reason you can add an 'attachment' form to it. There is a permanent indication of the percentage of disk space being used. As mentioned, provided less than 50% of the disk used, the entire file can be re-designed. However this is a lengthy process (not yours fortunately) and can take an extremely long time for the computer to re-format your file.

"The search facility is very powerful"

Various options are offered where you can easily add, delete or change a form. The search facility is very powerful. The file I created was for Shipping Information. I had the name of the Ship, its Owners, Port of registry, Gross Tonnage, Agent's name, address and phone number. The search allowed me to 'pattern match' or use 'wild cards' with titles, or find ships whose Gross tonnage were less/greater/equal to etc. In brief you can search by 'full pattern', 'partial item', 'numeric item', 'numeric range', and 'not match'.

The printing options provided are good and flexible. You can define a print specification and even save it to disk. You can choose to have the 'field titles' printed or not, and your data can be printed using the same facilities provided in the search option. In short, you

can choose how the final printout is going to look.

FILE supports good error handling with a reasonable amount of error messages. Overall, it is fairly fast in searching specific fields. It is user friendly enough, avoiding unnecessary multi-function key entries and learning to use it is simple A 'backup' program is provided for backing up your data files and adequate messages are always displayed prior to FILE making any changes to your data on disk.

There is no colour command, so you have to live with the preset colours. A blue or grey background (depending on what option you are in) with white characters. Yellow reversed field highlights the 'field' titles. A 'dong' sound is produced every time an invalid entry is made. Sadly, there is no disk command to allow you to new a disk. So if you find (after loading and running FILE) you have no formatted disks you have to switch off and start again. Going by its capability and price, FILE is aimed at the serious home or small business user. On this aspect it is a shame that FILE only supports Commodore printers (or so the manual implies).

Nevertheless, FILE is an extremely powerful, versatile and easy to use program and should find a place in this very competitive field.

Contact: P&P Micro Distributors, New Hall, Hay Road, Rossendale, Lancashire DD4 6JG. Tel: 0706 217744.

Computer dating

Can the computerised desk diary ever replace a pocket-size book? Tony Lydeard finds out.

Desk Diary is a Commodore 64 program consisting of a program disk, a data disk and a 50-page A5 manual. The program takes about three and a half minutes to load, after which the main menu is displayed. This offers the user a range of options comprising Appointments, Desk Data, Easy Analysis, Desk Message and Easy Use.

The "Appointments" option is the diary proper. A date must be entered in the form DD/MM/YY (ie Day/Month/Year). When the relevant file has been loaded from disk, a page is presented with the selected date as a heading. Details of appointments, anniversaries etc can then be entered for that day and saved for future reference. To enter appointments for any other day, you return to the main menu, select the Appointments option, enter the required date and wait for the disk to supply the new page.

Referring to the Appointments pages without writing on them is rather easier and can be accomplished in one of three ways!

The easiest way is through a window on the main menu page. Ten days are available at a time and the cursor keys can be used to scroll through the pages and across them in order to read the entries. Pressing "+" or "—" loads the next 10 days or the previous 10 days.

"Easy Analysis" mode offers the choice of "Date Search" or "Text Search." "Date Search" prompts for a start date and then displays that page of the diary. Pressing F1 calls up the next page, enabling the user to scan through the diary.

"Useful for recalling dates of appointments"

"Text Search" also prompts for a start date and then invites you to enter a string. The first page after the start date which contains the chosen string is then presented. F1 can be used to call up the next page on which the string appears. This feature is useful for recalling the dates of appointments with a particular individual or company. Pages viewed in either of the "Easy Analysis" modes can be printed out on a Commodore printer.

"Desk Data" mode gives access to 19 pages of information. These pages work in the same way as the Appointments pages in as much as information can be called up, entered, deleted and saved. Infuriatingly, some pages are stored on the Data disk and some on the Program disk, necessitating some nifty disk-switching if several pages are to be referred to.

"Desk Message" mode is a single page of the same type and is intended for communication between diary users.

The "Easy Use" mode enables the program to read files which have been saved from Easy Script, Easy File or Easy Calc.

"Any page can be saved as a file"

Any page of information throughout the diary can be saved as a file which can subsequently be read via Easy Script.

The program's main shortcoming is that the data disk only holds information for a diary spanning a three month period. If the date entered while the program is being loaded falls outside the Quarter for which the disk is configured, the program will reconfigure the disk for the current quarter, having first checked that that's what you want it to do. Thirty pages in each quarter are reserved for "Future Appointments," which are automatically entered in their correct places when the disk is reconfigured.

Desk Diary is not particularly fast — probably due to the fact that most of it seems to be written in BASIC. Neither is the program very robust — accidentally pressing the STOP key could mean reloading the program from the start.

To operate my other diary, I turn to the appropriate page and either read it or write on it with a pen. I can keep track of my appointments; maintain a list of telephone numbers; remember my mother's birthday; find my way round the London Underground, the Motorways of Britain and BR's Intercity network; check whether next Monday is a Bank Holiday and jot down the punch lines of new jokes that I hear. None of these operations takes longer than thirty seconds and the diary fits neatly into my pocket!

I think the writers of Desk Diary have fallen into the trap of writing a program just because it can be done. The diary certainly works — but not as well as the old-fashioned method that it's supposed to be replacing. And for the £29.95 that the program costs, you could buy a magnificent leather bound diary and still have enough change for a couple of blank disks.

Contact: Associated Services (London) Limited, 23 Chesham Street, London SW1X 8NQ.

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So go on — spoil yourself. If you are the owner of a Commodore personal computer treat yourself to an Epson — and a Comprint of course!

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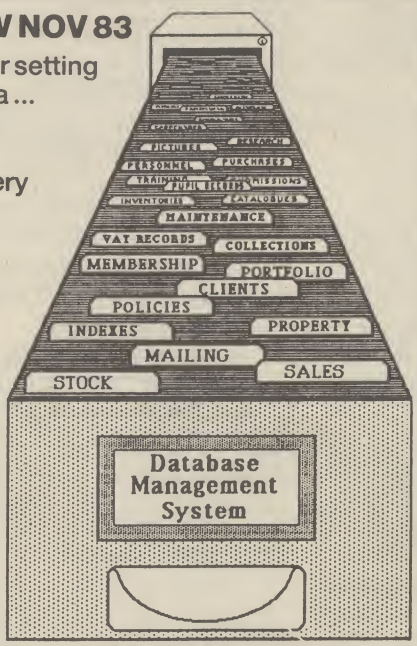

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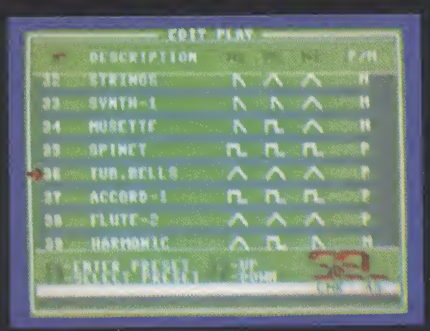

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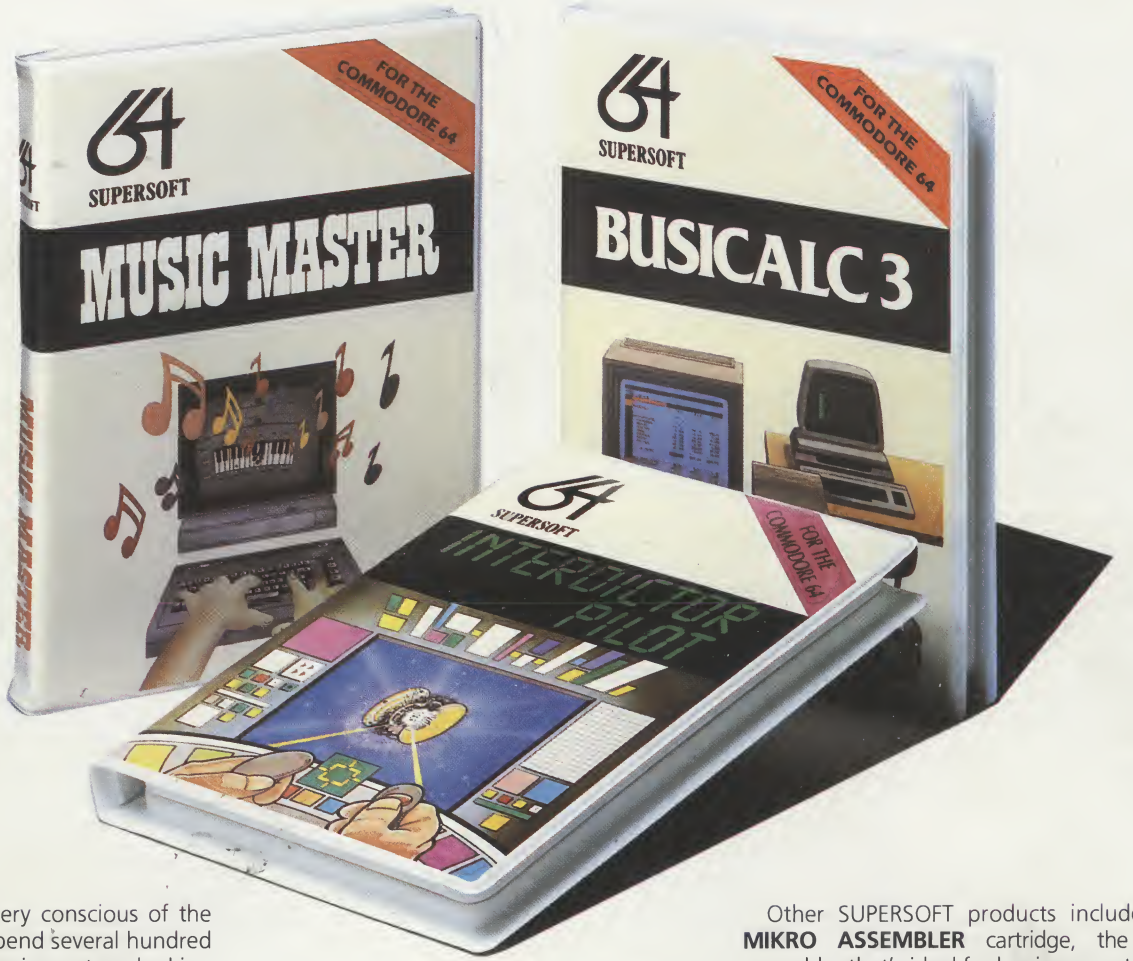

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